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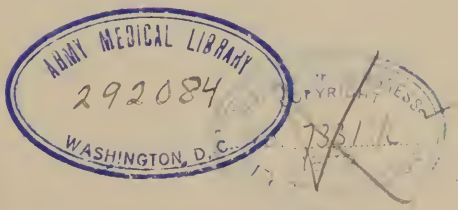
ELECTRICITY AS A MEDICINE,

AND

ITS MODE OF APPLICATION.

BY

JOHN IVES, M.D.



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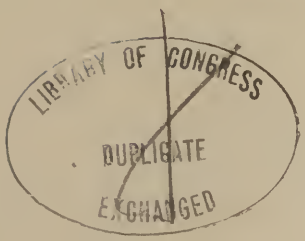

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PREFACE.

In presenting this Treatise to the public at large, I lay no special claim to originality, but shall avail myself of the experience of the most noted electro-therapeutists the world over. It will be my aim to present, in as concise a manner as possible, the different kinds of electricity used, with the mode of application in the various diseases in which it has demonstrated its superiority over all other remedial agents.

What the people, who are becoming daily more and more thoroughly convinced of its efficacy, want to know is: when, how, and what form of electricity to employ, in any specified complaint; which need I hope to be able in part at least to supply.

I shall avoid, as far as may be, all technicalities in speaking of disease and the mode of treatment. Just here permit me to say, that I do not claim electricity to be a specific for every disease to which we are physically subject, but a power which, if judiciously persevered in, will cure, in a multitude of cases, more readily than any remedy known to the Materia Medica; and, moreover, when all other devices and modes of treatment have failed.

Of this latter statement, every day's experience affords

ample proof in the hundreds, may I not say *thousands* of the cured, that otherwise through a life of pain would have settled hopelessly down under the weight of an incurable disease.

Finally, it is my purpose to give a short history of electricity, from the date of its discovery down to the present time, the batteries best adapted to its employment as a medicine, define the meaning of terms necessarily employed, and conclude by explaining the mode of application in the various diseases to which it is applicable, abrogating all doubtful theories and points in dispute among electro-therapeutists, which only tend to confuse the general reader.

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CHAPTER I.

HISTORY OF ELECTRICITY.

A LIMITED knowledge of the curative properties of electricity was known to the ancients. Its early dawn was observed by an eminent Grecian philosopher some six centuries before the Christian era. He found that by rubbing amber it would attract light substances. Failing to comprehend the cause of this phenomenon, he reasoned that it had a soul; when, in fact, he had only decomposed its natural electricity, and established in it an electric force. Natural electricity pervades all nature, things animate and inanimate. Without its invigorating influences all life would become extinct. Animal life depends upon the continuous disturbance of the separate molecules of the nerves, blood, and tissues of the body; and these disturbances are attended with the elimination of heat and electricity. When these disturbances cease, life ceases. Thus it is that artificial electricity, by exciting these sluggish molecules, becomes so powerful an agent in sustaining life. The lightning's flash and the electricity of amber, sealing wax, glass, etc., are identical in form; a subtile and imponderable fluid.

As I have remarked above, the properties of electricity were known to the ancients; their batteries, however, were not the creation of art; accommodating nature supplied them in the raja torpedo, found so universally in the Mediterranean Sea.

In the days of the Roman Empire, and even at a much

later period, shocks from the torpedo were employed in the cure of gout and other maladies. It was not, however, until the year 1786, when Galvani discovered what is known as Galvanism, that any material advance was made by scientists in the study of this new and wonderful agent.

The invention and subsequent introduction by Volta in the year 1800, of what is known as Volta's pile, gave a new impulse to the investigation and use of electricity in the cure of *otherwise incurable* diseases.

Loder, Bischoff, and other eminent German physicians, with Haller, of Paris, found it invaluable in paralysis of the limbs and the nerves of sense. It was administered in cases of deafness and impaired vision with the happiest results. Melancholia, corea, epilepsy, rheumatism, scrofulous enlargement of the glands, etc., were cured, or greatly benefited.

Yet in many instances it disappointed the expectations of the practitioners and friends, and this was due, however, more to the inexperience of the physician, and to the imperfection of the instrument, than to any other cause. So, after a time, electricity fell into disuse, the profession being slow to recognize its curative power. Physicians seemed to forget then, as now, that frequent failures confront them in the use of the most approved remedies. Then the charlatan caught it up and proclaimed it the panacea for every ill. Thus, for a time, it slept the sleep of ignorance and prejudice.

Notwithstanding all this, it still retained a few friends, among whom Magandie ranked the foremost, and who did more to rescue it from unmerited neglect and obloquy than all others. The discovery of our own Franklin, and the invention of the interrupted current by Faraday, materially aided in restoring to favor this long-neglected remedy. Still the larger proportion of the profession remained skep-

tical, and it was not until the improvements made in the instruments, adapting them more to the requirements of the remedial art, that some of the shrewdest investigators in Germany, France, England, and Italy bethought themselves to invite back to favor the long-derided and neglected remedy. For forty years the leading minds of Europe have continued their investigations, and to-day are louder than ever in praise of its efficiency in a wide range of diseases. The profession, however, in this country, have been slow to embrace it. Not till within the last ten or fifteen years has the American physician, so fond of *regularity*, opened his mind to receive the truth, and then not until it was forced upon his consideration by facts incontrovertible. Thus has it made progress, and to-day electro-therapeutics stand confessedly an indispensable adjunct to medical science.

To Professor William A. Hammond, M.D., of this city, is mostly due the merit of introducing electricity as a remedial agent to the medical profession in this country.

We should not forget to mention, however, Alfred C. Garratt, M.D., of Boston; Prof. J. C. Cabell, M.D., Charlottesville, Va.; Prof. Roberts Bartholow, M.D., Cincinnati, Ohio; Prof. Geo. W. Rains, M.D., Augusta, Ga.; Prof. Chas. E. Blumenthal, M.D., New York City; David Prince, M.D., Jacksonville, Ill.; Prof. E. C. Seguin, M.D., New York City; S. Weir Mitchell, M.D., Philadelphia, who were early and earnest laborers in this field of investigation.

As previously stated, it was not till within the last decade that electricity received anything like the attention it merited from the medical profession. To be sure, scientists experimented, and a few of the more inquiring among medical men gave shocks of static electricity, which were, at times, *shockingly barbarous*, and too often *shockingly* injurious. Fortunately for the good name of the profes-

sion, as well as for suffering humanity, this cruel treatment has been abolished, and, instead of painful shocks of electricity, a pleasant and invigorating flow of the same is made to permeate a part or the whole of the system, as the case requires.

The profession had long felt the need of some remedy better suited to certain forms of disease than was to be found in the Materia Medica, and it was at length discovered in electricity, in one or other of its forms. By its intelligent use the blind have been made to see, the deaf to hear, and the sick restored to health. It is not my purpose to belittle the administration of medicines when they ought to be given, but to set forth electricity as a remedy too *frequently neglected; a remedy that, when all others fail, comes to our aid and effects a cure.*

In skillful hands it can be applied to the most sensitive organization, and to children of tender age. It is specially beneficial in summer complaint of children and teething, by allaying irritation. It imparts *tone* and *vigor* to enfeebled organs, and strengthens the most nervous and debilitated constitutions. Of all our investigations into the mysteries of nature, none have been more beneficial, none more wonderful and astounding in their results than those which have arisen from the study of electricity. In proof of which, we have to refer only to the telegraph, the advances made in science and the arts, the electro-plate, the telephone, electric motor, electric light, and more than all and above all these, are its remedial virtues. And yet electricity as a science is still in its infancy, having slept for these long ages, awaiting the disturbing touch of modern thought to bring it into new and fuller relations with mind and matter.

CHAPTER II.

VARIETIES OF THE ELECTRIC CURRENT.

Electro-therapeutists usually refer to three varieties of the electric current: Static, or Franklinism, after our Franklin; Galvanism after Galvani; the induced current or Faradic, after Michael Faraday, who discovered it in 1831.

STATIC ELECTRICITY.

Static electricity, or Franklinism, is produced upon a glass plate, or cylinder, which when touched, gives off sparks, and imparts shocks more or less severe according to the amount of electricity accumulated upon the receiver. This variety is but little used, the galvanic having almost altogether superseded it.

MAGNETO-ELECTRICITY.

This is frictional electricity, created by what is commonly known as the crank machine. It is a somewhat prevalent impression that magneto-electricity and galvanism are one and the same thing. This is not so very strange, since these machines have been sold by their makers, and by some druggists as galvanic batteries. The current from this machine is somewhat stimulating and has proved beneficial in some cases, but the current is harsh, disagreeable, irregular in action, and inconvenient to operate.

ELECTRO-MAGNETIC OR FARADIC CURRENT.

This important variety of electricity, known as the induced current, is furnished by the electro-magnetic machine

so deservedly popular with the medical profession. Its chemical action or analytical effect is quite limited. For this reason it is more safely employed in domestic practice, than galvanism, when not well understood. The medicinal effect of this current is stimulating to the muscles, blood-vessels, and nerves, and is therefore efficacious in paralysis, rheumatism, sciatica, etc.

THE GALVANIC CURRENT.

Galvanism, or continuous current, is generated by the apparatus known as the galvanic battery. This current when applied produces no pain or any shock to the patient, unless when broken (which may be done either by the commutator, or by an interrupting handle). If the current be weak, the patient feels nothing, or next to nothing. If it is strong, he only feels a tingling or burning sensation at the place of application, and yet, even when the current is weak, it is a powerful agent, doing its work almost imperceptibly. It possesses strong decomposing powers, and is capable of giving effects as obvious and distinct as those that follow the administration of an emetic. Although a prompt remedial agent, it is under complete control, and if the instructions are followed, it is a safe and simple remedy for family use.

GALVANIC DISKS.

These contrivances as constructed by Garratt & Co., of Boston, are efficacious in some complaints, and often relieve local pains.

CAUTION.

The country is being flooded, at least as fast as advertising can do it, with so-called electric ointments, electrical plasters, electro-magnetic belts, etc. The above-mentioned are impossibilities, therefore gross deceptions.

A galvanic current is generated by a galvanic belt, properly

constructed, and yet they should be used with extreme caution—the action only affecting the surface. Althaus, in his recent work on Medical Electricity, says: "It is often the case that the persistent use of Pulvermacher's chains and galvanic belts paralyze the blood-vessels, and sloughs are produced." These sores are often difficult to heal.

I commend galvanism as one of the most efficacious remedial agents known to the profession. In proof of which I cite the following opinions:

Professor William A. Hammond, M.D., says: "It is the duty of every physician to study the action of electricity, to become acquainted with its value in therapeutics, and to follow the improvements that are being made in the apparatus for its application in medicine, that he may be able to choose the one best adapted to the treatment of individual cases, and to test a remedy fairly and without prejudice, which already, especially in nervous diseases, has been used with the best results, and which promises to yield an abundant harvest in a still broader domain."

The opinion of Herbert Tibbits, M.D., L.R.C.P., London: "I need hardly recall to mind that, until quite recently, to venture to speak of electricity as a curative power, was pretty certain to result in the speaker being branded as little better than a quack; and even now, although this universal skepticism has disappeared, ninety-nine out of every hundred medical men content themselves with the theoretical belief that in certain cases electricity *may do good*, without themselves *using it;* but I hope that before long it will be as common to see an electrical instrument on the consulting-room table as a stethoscope or an ophthalmoscope."

Opinion of Allan McLane Hamilton, M.D., New York: "I indorse electricity as a *very* valuable remedy in certain diseases. As a therapeutical means in nearly all forms of nervous disease, electricity is invaluable."

Dr. Francis E. Anstie, F.R.C.P., London, says: "I am now fully able to speak with far greater assurance of the *positive value* of electricity as a remedy for *neuralgic pain.* I shall make bold to say that nothing but the general ignorance of the facts can account for the extraordinary supineness of the mass of English practitioners with regard to this question."

Dr. Hammond (referring to the above) then says: "This is true of America. Many of our physicians know almost nothing of the *great benefits to be gained by this agent*, and have a groundless skepticism of all that is said in its favor."

J. Russell Reynolds, M.D., F.R.S., London, says: "With regard to *treatment* by electricity, by its application you can cure, relieve, and arrest the progress of many diseases."

Extracts from Dr. James B. McCaw's address upon "The Modern Science and Art of Electro-Therapeutics," delivered before the Medical Society of Virginia, at Abington, October 15, 1874: "Electricity is the great force alike in the organic and inorganic world. It is the great stimulant of vegetable life; but the animal organism is pre-eminently under electrical influence. In man this influence is very marked. The nervous centers are but so many electrical batteries, and the nerves but so many conducting wires, while the brain serves as the registering organ. Every tissue, except the skin and bone, is under the control of animal electricity. Changes in temperature are changes in the electrical force."

Extracts from the address of Dr. J. M. Toner, of Washington, D.C., President of the American Medical Association, delivered to it at Detroit, June 2, 1874: "Progress is the order of the day—a law of the universe. He who does not constantly keep adding to his knowledge and increasing his resources, must soon fall behind the more enterprising and the better informed of his contemporaries. The physi

cian who does not know that the community in which he lives is keeping a constant watch upon him, and contrasting his knowledge, skill, and success in his profession with those of the best and most successful medical men within the range of their reading or acquaintance, shuts his eyes to an important fact of great interest to himself.

"Electricity justly deserves the careful attention which has recently been given to it by a number of medical observers in our own and other countries."

CHAPTER III.

IMPORTANCE—EFFECTS—GENERAL PRINCIPLES.

We will now consider briefly its practical importance in the treatment of diseases. First, then, Electricity acts as a direct stimulant. It increases the supply of blood to the part acted upon, or lessens the supply, *according to the kind used and the mode of application.* It increases the heat as well as the volume of the part subjected to its influence, by augmenting the contractile energy of the vascular system. It counteracts the secondary changes which obtain in inactive nerves and muscles. It also restores their lost functions. With it we act directly upon the brain and spinal marrow. It soothes and tranquillizes the most nervous organism.

Thus its importance becomes at once apparent in all diseases in which the nerves are unduly excited. It is the safest and most reliable remedy in neuralgia, sciatica, rheumatism, gout, and kindred affections. Acting directly upon nerve centers, it is superior to all other remedies in every form of paralysis. By its stimulating properties it commends itself as a remedy for loss of voice, nervous prostration in all its varied forms, to wit: despondency, spinal irritation, impotency, etc., etc.

EFFECTS OF GALVANISM.

When galvanism is applied to the brain, flashes of light are produced; taste, when applied to the tongue; sounds, when the ear is electrized. When applied to a nerve of

motion, it produces muscular contractions; if to the skin, sensations of pricking and heat. By it the increased sensibility in neuralgia, sciatica, and various other nervous affections are relieved.

To allay the excitability of a nerve I usually apply the positive electrode to the painful spot, and the negative to some other part. The galvanic current is capable of removing morbid conditions of the tissues, arising from defective circulation of the blood. Through its efficacy in relieving spasms, it is effective in shaking palsy, stammering, St. Vitus' dance, and writers' palsy. It is also an invaluable remedy in certain forms of paralysis, in numbness of the extremities, wasting of the muscles, etc. The poles of the battery have their own peculiar influence upon animal tissues. The positive pole, through its soothing effect, relieves pain and tranquillizes the excited nerves. The negative pole, on the contrary, is stimulating, and increases the excitability of diseased nerves. They consequently play an important part in the treatment of disease. If, therefore, it is our purpose to tranquillize a nerve, we apply the positive electrode to it; but, if we would arouse it into action, apply the negative to the nerve. There are, however, exceptions to this general rule. A too strong current, and even a mild one, too long continued to the brain, may produce giddiness, fullness, and pain in the head, sickness at the stomach, and vomiting. In very many diseases of the brain a mild, continuous current will do a vast deal of good by its stimulating effect, aiding nutrition.

The refreshing effects of galvanism are marked in cases of excessive fatigue, and in disease when the power of the muscles is weak, or entirely lost. The effect attributed to the galvanization of the sympathetic nerve is to increase the size of the blood-vessels, and augment the flow of blood to the part; again, it has a directly opposite effect, depend-

ing upon the position of the electrodes, which will be explained when we come to speak of certain diseases of the brain and spinal cord. A feeling of drowsiness is also produced upon the application of the current to the nerve, and continues even after the application ceases; this is most probably due to the influence of the current over the vasomotor nerves of the head communicating with the cervical sympathetic. It is important to galvanize the sympathetic in diseases of the brain, spinal cord, wasting palsy, infantile paralysis, and in palsies of the extremities, etc. It restores lost nerve-power, excites muscular irritability, and imparts heat and vitality where fatty degeneration of the muscles has not progressed beyond all possibility of cure; thus the importance of early, persistent, and intelligent applications of the continuous current to the diseased part at once becomes apparent.

The most effectual way to galvanize the sympathetic is to place one electrode in the auriculo-maxillary fossa, and the other over the seventh cervical vertebra on the opposite side of the neck. By this process we affect the upper cervical ganglion, the base of the brain and the spinal cord.

If we would affect both cervical ganglia, pneumogastric and depressed nerves, place one electrode, usually the positive, as before, in the fossa, and the negative at the manubrium sterni.

Through its electrolytic or decomposing potency we are enabled to discuss tumors, dropsy of the joints, bunions, mothers' mark, varicose veins, goitre, glandular swellings, etc.

GENERAL PRINCIPLES IN APPLYING GALVANISM.

There are a few general principles which it may not be inappropriate to notice. If we would soothe an excited and painful nerve, whether central or peripheral, apply the positive above or on the trunk of the nerve, and the negative

below or nearer to its extremity. When we would excite a nerve, we apply the negative above and the positive below, or to a more peripheral part. The current is the most sensibly felt at the negative pole.

It is of the utmost importance in the use of this remedy to employ a mild current gradually increased, but never to the highest point the patient can bear; *using electrodes well moistened in tepid water.* Many a nervous patient has been frightened from the use of electricity *by the heroic treatment* that might have been relieved and years of suffering dispelled, but for the imprudence of the operator in dashing on a current of high tension. Next in importance are short applications. Again, when the patient is relieved, stop; no matter how brief has been the séance. Usually from thirty seconds to a minute or thereabouts is long enough to the head. To the spine and limbs a longer time may be consumed in the treatment, ranging from five to ten minutes, repeated every day or every other day. When dizziness, flashes of light, nausea, and faintness are produced, it is an indication to moderate the current or to stop the treatment for the time.

EFFECTS OF FARADIZATION.

The action of the faradic current on living tissues is not so complex as galvanism, and better understood.

The more marked effects, briefly stated, are as follows:

Faradization disturbs the particles of matter which enter into the formation of the nerves and muscles, excites them into healthful activity, and re-establishes their functions when impaired or lost. Again, a *slowly interrupted current* permits the alternate contraction and expansion of inactive and paralyzed muscles, by increasing their nutrition.

It also determines a larger supply of blood to the part electrized, and consequent increase of heat and size.

It stimulates the sentient nerves of the part submitted to its influence, and thus becomes an important remedy in anæsthesia, or loss of sensation.

The usual method of applying the faradic current is by means of sponge-covered electrodes (chamois skin or flannel will do as well), particularly if it is desirable to reach deep-seated tissues. When we only wish to act upon the skin, we then use metallic disks, or the wire-brush—except when we apply the disk to the palms of the hands or the soles of the feet, in which case it is best to moisten the disk, as the thickened skin, especially of these parts, is a poor conductor of the electric current.

In order to excite a muscle most effectually, we apply one electrode to the motor point of the nerve; or, in other words, where it enters the muscle, and the other to the belly of the muscle by means of moist sponge-covered electrodes.

GENERAL FARADIZATION.

A few remarks upon general faradization in certain nervous complaints, where a tonic effect is desired, may not be out of place in this connection. The patient places his bare feet upon a foot-plate of copper or tin, covered with a wet sponge or moistened flannel, which is connected with the negative pole of the battery, the positive upon the back of the neck, and a pleasant current is allowed to flow for a few minutes, then the positive electrode may be removed to the chest, shoulders, arms, down the spine, in short, all over the patient. The moistened hand may be used as an electrode to the head; some prefer it to all other methods of electrization. When it is only necessary to electrize the upper extremities, take the negative in the hands and apply the positive as before; the séance lasting fifteen or twenty minutes, adapting the intensity of the current to the sensitiveness of the parts.

THE LOCAL APPLICATION.

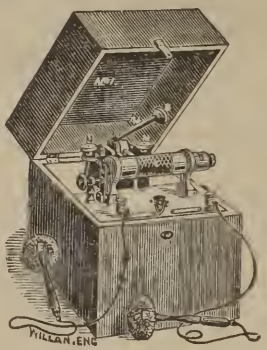
When the disease is local, confined to a nerve or muscle, joint or limb, as is the case in neuralgia, rheumatism, enlarged joints, etc., general electrization will be of little or no benefit; in which case the application should be directed to the painful part. Duchenne of Bologne was the first to teach the advantages of local electrization. He seldom or ever resorted to general or constitutional treatment. Surely no intelligent person would hardly expect by passing a current simply through the arms to relieve a pain in the leg. Yet such has been the case, and electricity blamed for not effecting a cure. I hope none of my readers have been guilty of the like indiscretion; if they have, abandon it at once, and resort to local applications in similar cases.

CHAPTER IV.

ELECTRICAL INSTRUMENTS AND DEFINITION OF TERMS.

In order to obtain the best results from the use of electricity it is essential that the instruments should be properly constructed, therefore great care should be taken in their selection, and they should be purchased only of well-known dealers and manufacturers. They should be free from all complications, easily managed and effective.

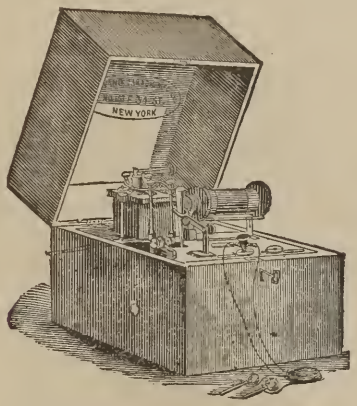
FARADIC MACHINE WITH FINE VIBRATOR.



It is desirable that the faradic instrument should furnish a smooth, pleasant, and agreeable current, the strength of which can be gradually increased to any desired intensity; especially should this be the case when the current is to be used about the head, brain, and organs of special sense. When a stimulating effect is needed, for instance in pa-

ralysis and kindred affections, then it is necessary that the instrument be furnished with a Rheotome, by which the current can be interrupted at slow and regular intervals.

FARADIC MACHINE WITH RHEOTOMES FOR SLOW AND FINE VIBRATIONS.

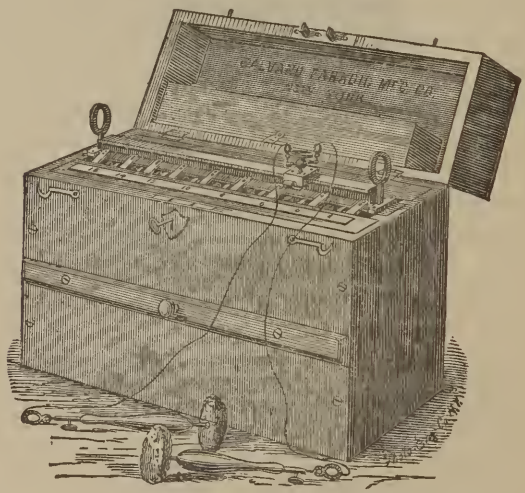


The advantage of this slow breaking of the current is to produce contractions and expansions of the muscles, etc., similar to the effect produced by using dumb-bells, rowing, and other gymnastic exercises.

A galvanic battery should be constructed so as to be convenient and easily cared for, and contain from twelve to thirty or forty cells, according to the disease to be treated. They should be furnished with a current selector by which the current from each cell can be brought into action without causing any shock to the patient. It should be provided with a commutator (sometimes called polarity changer), by which the current can be changed from positive to negative, or *vice versa*, at will. In the treatment of some diseases it is desirable that the current should be interrupted; for this purpose the Rheotome attachment is neces-

sary, and by which muscular contractions can be effected. I have used a number of instruments of foreign make, but do not find them as convenient as those made in our own country. Among the prominent manufacturers of instruments in this country, I give the preference to those made by the Galvano-Faradic Manufacturing Company of New York,

A GALVANIC BATTERY.



as they meet the requirements of practice more fully than any others, although the instruments of Kidder, Fleming, and Talbot, and others have their merits and friends.

What Dr. John J. Caldwell, of Baltimore, says relative to the importance of providing electrical instruments in all life-saving and police stations, applies with almost equal force to families. I consider a good faradic instrument worth more in a family than the best stored medicine case can possible be. Children do not object to the application of it, but on the contrary are pleased with it; all ages, sexes,

and conditions may resort to it, not as a cure-all, but as a remedy more serviceable than all others combined. I would recommend to families who can afford it to provide themselves not only with a faradic machine, but with a galvanic battery, to be in readiness in cases of emergency, which may arise at any moment.

The physician may live miles away and valuable time or even a life may be lost while waiting for his instrument (if he happen to have one); then again, physicians do not always find it convenient to carry their electrical instruments with them when making their professional calls; and many of large practice, while they would like to use it, can not afford the time, and prefer that their patients be provided with their own instruments to be used under their directions. Oftentimes it is not convenient for the practitioner to be in daily attendance, and yet the patient may require its daily use; and if the application be not to an internal organ, an intelligent observer may apply it in the doctor's stead.

The want of time on the part of the physician, the inconvenience of carrying their instruments about are the main reasons why this important remedy has not been more universally employed.

I was informed by one of our leading manufacturers that the demand for his instrument for family use was rapidly increasing.

One of our most prominent citizens told me "that if he were compelled to part with either his electric battery or Croton water, he would dispense with the water—providing he could not replace the instrument."

The editor of one of our largest and most influential religious papers, said "that his wife refused to go on a foreign tour until he ascertained that the instrument which she so highly prized could be taken with her and arranged for travel, and long absence from home."

DEFINITION OF TERMS USED IN THIS TREATISE.

CONDUCTORS.—The cords which convey the currents.

ELECTRODES.—The terminal points of the conducting cords, usually sponge-covered.

POLES.—Same as electrodes; one positive and one negative.

FARADIZATION.—Use of the faradic current.

SECONDARY CURRENT.—Supplied by the outer coil of the Faradic instrument.

GALVANIZATION.—Continuous current, same as galvanism.

ELECTRIZE.—Application of electricity.

MILD CURRENT.—When used in connection with galvanic battery, from two to six cells.

STRONG CURRENT.—When used in connection with galvanic battery, from ten to twenty cells.

MILD CURRENT.—When produced by the faradic or electro-magnetic machine; when the regulating tube is withdrawn but a little.

STRONG CURRENT.—When the tube is drawn out one-half to three-quarters of its length.

WIRE BRUSH.—An electrode made of fine wire.

ELECTRIC HAND.—Making the connection by using the hand as an electrode.

FOOT-PLATE.—A flat electrode on which the feet are placed.

SYMPATHETIC, PNEUMOGASTRIC, AND PHRENIC NERVES.—These nerves play an important part in nutrition, respiration, and circulation of the blood—the Sympathetic is found in the depression under the ear at the outer angle of the lower jaw; the Pneumogastric is found at the outer angle of the lower jaw in close proximity to the Sympathetic; the Phrenic is most superficial at the center of the neck, in an almost direct line between the ear and collar bone.

CHAPTER V.

Diseases and their Treatment.

FATIGUE.

The sedentary are fatigued from mere inaction; the merchant from the confinement to the details of business; the student and professional man from over-brainwork. Unlike the man used to healthful exercise, these retire to a couch of wakeful restlessness, and when morning comes, they are unrefreshed and unfit for the emergencies of the day. Electricity, from its stimulating, tonic and sedative influences, is what the system needs. It imparts new life and vigor; it exhilarates and strengthens; it soothes and tranquillizes the most nervous organism—thus inducing sleep, it becomes "Tired nature's sweet restorer." General faradization may be resorted to in this instance from five to ten minutes, or even twenty in some cases; then place an electrode in each hand for five minutes longer, using a mild current, imparting a pleasant thrill to the parts. Again, a more local application may be made to the spine, bowels, and chest—adapting the strength of current to the varying sensibility of the parts.

HEADACHES.

Nothing can excel electricity in the cure of this frequent and distressing malady. In highly nervous organizations of either sex, particularly when the pain is in the forepart of the head, apply the current by means of what is known as the electric hand. The sufferer holds one electrode of the faradic instrument and the physician the other (in place of

the physician it can be done by the husband, wife, or any second party), applying the free hand to the forehead and temples, and using a mild current for two or three minutes. It is often beneficial to pass the hand over the nape of the neck, using the current a little stronger here, for one or two minutes, or alternate between the forehead, temples, and nape of the neck, using the current in all, ten minutes. When it is not convenient to have an attendant, the patient can use the sponge-covered electrodes instead, and use as above. Treat sick headaches in the following manner: apply one electrode to the forehead and temples, and the other to the pit of the stomach, using a mild secondary current for five minutes. When the pains do not yield to the above treatment, I use the galvanic current by placing the positive electrode to the forehead and temples, and the negative just back of the ear, using the current from four cells, for two or three minutes; alternate the above by placing the positive pole on the sympathetic, and the negative to the pit of the stomach, allowing the current from six cells to pass for five minutes.

DYSPEPSIA.

Dyspepsia and indigestion are treated successfully by the use of electric currents. I usually apply one electrode of the faradic instrument to the small of the back, and the other over the pit of the stomach and on the bowels, using a pretty strong current so as to excite the muscles of the abdomen and intestines. Move the electrode around over the whole abdomen and stomach; operate in this manner ten minutes every day, or every other day. When the faradic current is of no avail, I galvanize the sympathetic nerve, by applying the positive pole under the ear, and the negative to the stomach, using a moderate current for five minutes, morning and evening.

FLATULENCY.

I treat this complaint in the same way as in dyspepsia and by the faradic current, but in obstinate cases I use the galvanic current by passing a rectal electrode attached to the negative pole into the lower bowel four or five inches, and move the positive over the surface of the bowels with gentle pressure four or five minutes morning and evening.

OBSTINATE CONSTIPATION.

No remedial agent known to the profession can equal faradization in the cure of obstinate constipation. It is as effective as quinia in chills and fever. Employ the current daily by placing one electrode on the small of the back, and move the other over the entire surface of the bowels, pressing the electrode firmly to the parts, using a moderately strong current for fifteen minutes. This method expedites the operation of purgatives. I frequently employ an electrode introduced into the rectum, the other over the bowels.

HICCOUGH.

This annoyance, when so distressing as to require special attention, is relieved frequently by galvanization of the sympathetic. Place the negative under the ear and the positive by the seventh rib for five minutes, using a current from four to six cells. *Persistent yawning*, usually of nervous origin, should be treated in the same manner.

PAIN IN THE STOMACH.

Faradize with one electrode at the pit of the stomach, the other directly opposite on the back. Employ a moderately strong current, five or ten minutes if necessary.

COLIC.

The causes of this distressing complaint, among many others are indigestible food, constipation, and vitiated biliary secretions. Griping pains are felt, with a twisting in the region of the navel, cramps in the bowels—these are a few of the early symptoms. Sometimes these symptoms arise from a hernial protrusion, which should be looked after. Faradization of the bowels is the most usual mode of treatment. It is employed in the same manner described for constipation and flatulency, to which I refer the reader. If it should result from an incarcerated hernia, faradize it as directed when treating of that disease.

EXCESSIVE NAUSEA AND VOMITING.

These somewhat obstinate symptoms of trouble, not always traceable to the stomach as the primary cause, are relieved by the electric current, when all other remedies fail. Use a moderately strong current from the faradic instrument by placing one electrode over the stomach, and the other directly opposite on the back. It is well also to apply one of the electrodes to the sympathetic nerve. Treat in this way ten minutes. Numerous cases might be reported of *obstinate vomiting* in pregnancy cured by electricity. M. Le Coniat claims to have cured in this way ninety per cent. of persons afflicted with sea-sickness. Dr. Dwinelle reports the case of a lady afflicted with sea-sickness, followed by convulsions, cured by one application.

LIVER AND GALL-BLADDER.

The liver is often the seat of disease and functional derangements, causing sympathetic pains in various parts of the body, which may be successfully combated by faradization. The best method is to place one electrode directly

opposite on the back, and the other upon the liver, pressing it firmly down, using a strong current for a couple of minutes, then place it upon another part, and so on until its entire circumference has been brought under the electric influence, the séance lasting ten or fifteen minutes.

The gall-bladder is found at the lower margin of the liver; sometimes it may be felt, but is most frequently found by percussion; it has a duller sound when percussed than its surroundings. It is beneficial to faradize this organ in certain diseases. Professor Gerhardt, of Wurzburg, says "it is as effectual in catarrhal jaundice as reduction is in the treatment of hernia."

When the gall-bladder is found, place one electrode on it, and the other to the back, using a strong faradic current; the electrode must be pressed firmly in the direction of the spine, the operation lasting a few seconds only; the electrodes are removed and reapplied if the bladder is not emptied. The urine is affected by this operation beneficially, as well as the discoloration of the skin, if after two days a bilious stool is passed.

STRANGULATED HERNIA.

In this trouble, time is of the greatest importance to the patient. When it is discovered, faradize the hernial tumor by applying both electrodes to it, using a strong current. Another method is to apply one electrode to the strangulated bowel, and the other passed into the rectum. When the intestine recedes, cease the application..

Intussusception of the bowels may be treated in the same manner. It is well to reach the location of the invagination by means of a suitable electrode introduced up the rectum, using as strong a faradic current as can be tolerated, the other over the bowels.

N.B.—Consult your physician.

WAKEFULNESS.

Those who are suffering from this persistent and wearisome symptom of nervous excitement, will be pleased to learn of a remedy more efficacious than opiates or chloral, which only afford temporary relief and frequently endanger life. I use the galvanic current from four to six cells for two or three minutes, applying the positive pole to the forehead, and the negative high up on the nape of the neck. Sometimes it will be beneficial to apply one electrode on each side of the head, on the space behind the ear, or in same manner to each temple, from three to five minutes, an hour or so before retiring.

INTOLERANCE OF LIGHT.

This is a troublesome symptom attendant on various diseases of the eye, requiring the sufferer to keep the eye closed. It yields to the galvanic current upon a few applications. Place the negative upon the forehead over the center of the eyebrow, and the positive to some part of the face. At other times the positive may be placed upon the closed eyelid, and the negative under the ear. Use a mild current for a minute four or five times a day.

LOSS OF VOICE.

The loss of voice is often induced by a cold, fright, hysteria, etc., and frequently resists all treatment but the electric. Begin the treatment by employing the secondary current of the faradic instrument as strong as can be borne, by placing one electrode on each side of the neck just at the angle of the jaw, from three to five minutes. If after two or three applications the voice is not restored, apply the electric brush to the throat a few seconds at a time, using a strong current; this may make the patient cry

out, and this is what we desire. Sometimes in obstinate cases it may be necessary to faradize the throat internally, in which event, call in your physician.

HOARSENESS.

This annoyance is readily cured by faradization of the throat, by placing one electrode on each side at the angle of the lower jaw, using a gentle current, producing a pleasant thrill through the part five or ten minutes, then one electrode may be placed on the throat under the chin, and the other on the nape of the neck, and allow the current to pass for a few minutes.

SORE THROAT.

Use the faradic current, placing the electrodes one on each side of the throat; use a mild current, for five or ten minutes, two or three times a day.

DIFFICULT DEGLUTITION.

Whenever difficulty of swallowing is induced by spasm of the parts, faradization and galvanization is the best and often the only means of relief. The nerves of the throat should be electrized, which will require ordinarily the services of a physician. The pneumogastric may be reached by applying the positive to the depression under the ear, just at the angle of the lower jaw, and the negative at the top of the breast bone. Treat for a minute or two.

CATARRH.

This disease results from inflammation of the mucous membrane of the nostrils, which is much exposed to the sudden changes of the weather, causing an offensive discharge, frequently loss of smell, and sometimes deafness. The lining membrane of the nose in cases of long standing

often ulcerates; then a fetid, bloody discharge escapes from the nostrils. I have found no better remedy than the continuous current applied by means of a small nasal electrode, insulated except at the tip, attached to the negative pole and passed up the nostril, and so moved about as to affect every part internally; the positive is placed on the face near by. Keep the nostrils well cleansed. The operation may be continued from three to five minutes daily, using a current from four to six cells.

AUTUMNAL CATARRH.

This complaint is more commonly known as hay fever. It delights to repeat its visits periodically. It is treated by galvanization of the spinal cord and nerve-trunks every other day, using a current of moderate strength for five minutes or longer if necessary; the positive above, the negative below. Galvanize also the pneumogastric for a few seconds with a very weak current. General faradization (see directions) I have found beneficial.

LOSS OF SMELL.

This affection is treated much in the same manner as catarrh. I have found it useful to pass a mild current through the brain by placing the positive between the eyes, the negative on the back of the neck for two minutes.

TOOTHACHE.

This painful annoyance is most readily disposed of by the use of the continuous current; the positive usually being applied to the tooth or on the gum, and the other to the face near by, using a weak current. This may be too trifling a matter to be noticed among diseases of so much more importance, some may think; but the sufferer from this pain

will, I judge, be grateful for the knowledge of so simple and expeditious a cure. A small electrode—covered with sponge, leather, or flannel—may be used.

BUNIONS.

This is an annoying and unpleasant acquaintance, with which too many are afflicted. It is, however, readily relieved of its soreness and pain by a few judicious applications of the continuous current. Apply the positive to the bunion and the negative near by. The current from six cells is generally sufficient, but may be increased if not perceptibly felt.

CHILBLAINS.

Chilblains are occasioned by exposure to intense cold, and are often the source of great annoyance to the individual afflicted. They are attended with inflammation, followed frequently by deep and painful ulcerations. Paralytics, and those of enfeebled constitutions, whose blood is thin, are special sufferers. Faradization of the limb and blain will effectually obviate all these unpleasant symptoms. Employ a moderately strong current for five or ten minutes, repeated two or three times a day, if the sore is painful and increasing, until the pain is relieved. Continue the treatment every day, or every other day, until the sore is healed, which will ordinarily, even in paralysis, take place in two or three weeks.

CARBUNCLE.

This serious disease derives its name from *carbo* (a burning coal). It is attended with great heat and pain in the affected part, with intolerable itching; little blisters make their appearance on the surface, beneath which is felt a hard, circumscribed, deep-seated tumor. I advise the use

of the continuous current to the diseased part on the first approach of this painful and sometimes fatal malady. Apply as strong a current as can be borne for three minutes, repeating it three or even four times a day; the negative, armed with a metal disk, applied directly to the spot, and the positive near by. Sometimes it is well to interpose a moistened flannel between the disk and the part to be operated upon. Boils should be treated in the same manner.

FELON.

There are four varieties of this affection—of the fingers more commonly, but the toes are sometimes attacked. The variety to which I shall refer is that which begins under the periosteum, or lining membrane of the bones. The pain is confined to the finger, and there is no external swelling. Apply early a strong galvanic current from ten or twelve cells, if the patient will tolerate it, using as in carbuncle a metallic disk; the positive to the painful spot, and the negative on the opposite side of the finger, or to the back of the hand for three minutes, often repeated. This will be found to be effectual if employed as soon as the pain is felt.

CHILLS AND FEVER.

Upon the first indications of a chill it is my usual practice to employ a strong faradic current to the spine, chest, bowels, and liver, from five to ten minutes each, or until a sensible perspiration is excited. Where it is convenient, use a foot-bath of salt and water, as warm as it can be borne, placing an electric foot-plate in the bath, and apply the other electrode to the parts indicated above. This will prevent, and in most cases break, a chill. This treatment should be repeated whenever the indications of a chill are felt. It is often highly beneficial to use the

current frequently (omitting the bath), quite strong over the liver and down the spine. In this particular disease, I like the effect of slow interruptions.

ANÆSTHESIA (LOSS OF SENSATION).

This may arise from a variety of causes, and is either complete or partial. It may have a central origin, or it may arise from a disease of the peripheral nerves. Faradization is the best remedy, using a strong current to the part, after having well dried it; apply some absorbent (toilet powder, for instance), then touch the part lightly with the wire brush attached to one of the conducting cords for a few seconds at a time, the other placed near by. This may be repeated daily, if convenient, until relief is obtained. Before resorting to the brush, it is my habit to employ the secondary current of the faradic machine, and only resort to the brush when other means fail. Hysterical persons are especially subject to this affection of the nerves, sometimes fixed in a limb, at other times shifting about. In this form attendant on hysteria faradize the part as directed above.

NOISES IN THE HEAD.

The causes of this annoyance are but little understood. It usually comes on with advancing age, and is due probably to lack of nutrition of the nerve of hearing. Galvanism is the best remedy. Apply a mild current to the drum of the ear by means of a special electrode, the ear first being filled with tepid water, the negative in the ear, the positive on the temple, the current being slowly interrupted, and changing frequently the polarity of the current. Ordinary electrodes are also used, placing one behind each ear.

PTOSIS.

The drooping of the upper eyelid is best treated by galvanization; place the positive on the forehead and the

negative drawn lightly over the lid for a minute or two, employing a current from four to six cells. It may be faradized also, by placing one pole under the ear and the other over the closed eye, using a small sponge-covered electrode for two or three minutes.

AMBLYOPIA (WEAKNESS OF SIGHT).

Weakness of sight from lack of nutrition of the optic nerve is not an unusual occurrence. Purely medicinal treatment is of little avail. M. Lesueur has recorded a case of perfect cure of total blindness by faradization, but galvanization is the most certain remedy. When galvanism is applied to the eye of even moderate strength, it produces a flash of light, the intensity of which depends upon the strength of the current.

The usual mode of applying the continuous current in this affection of the eye, is to place a well-moistened positive electrode to the closed eye, the negative in the hand or back of the neck, using a mild current five or ten seconds, then removing them for as long a time, applying them again in the same manner five or six times. Numerous cases of cures might be cited would our space permit.

NERVOUS DEAFNESS.

This affection is frequently induced by over-exertion of the mind, grief, anxiety, sleeplessness, in short, every cause which may tend to weaken the nervous system. Faradization has been successfully employed, but I give the preference to galvanism. It may be used by applying an electrode on each side of the head, behind the ears, or, which is far better, by placing an ear electrode in the ear, filled with tepid water, and the positive to the temple, forehead, or in the hand. It will also be found of service to faradize the whole system where there is general debility. Another

way is to introduce, through the Eustachian tube, a fine copper wire, insulated, except at its extremity, into the cavity of the ear, having previously injected into it tepid water, and a mild current from four cells applied for a few seconds.

N.B.—Consult your physician.

TUMORS.

Not until electricity came to be understood in its application to the various tissues of the body was there any material advance made in the treatment of these unseemly growths. All manner of applications have been employed for their reduction, and the surgeon's knife has been employed as the only substantial cure, and even that sometimes failed.

We have in electricity a safe and reliable remedy in one or the other of its forms. Faradism has in some instances been used advantageously, but it is slow in its effects and consequently taxes the patience not only of the patient, but of the physician also. I use the continuous current to the tumor by means of moistened sponge-covered electrodes, employing a current from ten or twelve cells, for fifteen or twenty minutes, and sometimes longer, according to the character of the tumor, every day or second day, both electrodes being placed on the tumor. The treatment must be persistent. Swellings of lymphatic glands, goitre, ganglia, etc., are cured in the above manner.

ULCERS.

Crussel, of Germany, was the first to direct the attention of the profession to the use of galvanism in the cure of ulcers. He found that by using two metallic plates attached to the poles of a galvanic battery, placed on different parts

of the body, the positive pole was consolidating, while the negative pole was liquefying, *i. e.*, the positive was acid and the negative was alkaline or caustic in their effects upon the tissues. He observed that the negative electrode produced a sore not readily healed, while the positive, from its acid reaction, expedited the healing process.

Irritable, ill-conditioned, and sloughing ulcers, whether varicose or otherwise, are best treated by the continuous current. It is my usual practice to employ a metallic-plate electrode attached to the positive pole of the battery to the ulcer, having first covered it with a moistened piece of flannel, using a mild current, the negative near by. Ten minutes is ordinarily long enough. The application may be repeated daily. It is not advisable to use a current so strong as to cause pain. The most obstinate ulcers will generally heal under this treatment in two or three weeks. Keep the ulcer clean.

Mr. B., an equestrian manager, aged sixty, came to me with a varicose ulcer, which had resisted the usual treatment for months, went away cured in three weeks, though the veins of the leg and thigh remained as before—no attention being directed to them, as he was in haste to leave the city.

SPRAINS.

Nothing that I have ever used has proved so beneficial in sprains of the joints as galvanism, when applied immediately after the injury. Even in cases of long standing, (which have been treated with all manner of embrocations, leaving stiffness of the joint), galvanize for five or ten minutes, passing the current through the joint, repeating daily. Use from ten to twelve cells.

ENLARGED JOINTS.—*See* RHEUMATISM *and* STIFF JOINTS.

WOUNDS AND BROKEN BONES.

It frequently occurs that, after amputations, the wound does not heal readily, the stump is sore and painful. Faradize the stump by placing one electrode on it, and the other near by; a mild current, repeated daily for a brief period, produces healthy cicatrization of the part. Galvanism is also useful in such cases. Wounds occasioned by broken bones, where they are not inclined to heal, and are painful, may be treated in the same way beneficially. In fractures in old people, and in enfeebled constitutions, faradization is of consequence in restoring vigor to the system, enabling it the better to hold up under the slow process of bone-healing. It also expedites the healing process by determining a better supply of blood to the lining membrane of the bone, and to the bone itself.

STIFF JOINTS.

In this affection of the joints I invariably resort to the galvanic current, especially when the trouble is recent, by placing the positive electrode above on the joint, and the negative directly under it, thus passing the current through the joint. I use the current from eight to twelve cells for ten minutes every day. When the stiffness is only partial, and the attachments not extensive nor firm, a strong faradic current, of slow interruptions, will sometimes break up these adhesions. Mechanical manipulations of the joint should not be neglected.

HIP DISEASE.

In the forming stage of this disease of the hip-joint, the continuous current should be applied to the suffering part, the positive on the spine low down, and the negative over

the seat of the pain, for ten minutes daily, employing a current from six to ten cells; change the positive to the groin, and the negative move about over the thigh. In cases of long standing the above treatment is also beneficial.

PAIN IN THE BACK.

This very common complaint has proved to be a fruitful harvest for the sale of plasters, electric chains, belts, and a thousand and one advertised nostrums. It is often mistaken for rheumatism and kindred diseases, and frequently baffles the skill of the physician. I use in its cure both the faradic and galvanic currents. When applying the former, I place an electrode on the small of the back directly over the pain, and the other near by, and allow the current to pass about five minutes. It is well to move the electrode up and down the small of the back. This is quite a common complaint with women, and I have frequently removed the pain by applying both poles of the faradic instrument to the affected part, using a moderate secondary current for five minutes. I sometimes apply one pole to the bowels low down, the other to the small of the back for from seven to ten minutes, twice or three times a day. If the pain is intense, and is not relieved by this treatment, I use the galvanic current, by placing the positive pole on the small of the back, and the other laterally, using from ten to sixteen cells ten minutes daily.

CHAPTER VI.

Paralysis.

CEREBRAL PARALYSIS (*Hemiplegia*).

THIS formidable disease, in most instances, follows an apoplectic fit, which is generally caused by a rupture of a blood-vessel within the brain, softening, or from a tumor pressing upon the substance of that organ, disturbing its function to such a degree that paralysis of one-half of the body is the usual consequence. Both varieties of the electric current are indicated after the fever-stage of the disease has passed, which obtains usually in two or three weeks, if the patient survives the paralytic stroke; and even then the continuous current only should be applied directly to the brain, beginning with two cells of the battery for one or two minutes to the side of the head where the lesion exists; the positive to the forehead, the negative to the nape of the neck. A weak faradic current may also be applied to the limbs, to promote, as far as possible, their nutrition, avoiding the head, as the least shock there might cause a relapse.

The sympathetic nerve of the paralyzed side may be galvanized by applying the positive electrode in the depression under the ear, just at the angle of the lower jaw, using a narrow sponge-covered electrode pressed gently inward, and placing the negative to the side of the seventh vertebra of the neck, employing a gentle current for one or two minutes.

After the lapse of several months from the attack, it is not enough that we galvanize the brain and sympathetic, but faradization of the limbs should be resorted to, for, in most

cases, the paralysis is not alone due to injury of the brain, but to loss of energy from want of nutrition of the nerves and muscles of the paralyzed side. In cases where muscular excitability is normal, the continuous current should be employed, but where it is diminished, faradism should be resorted to. However, in some instances it will be found that the faradic current will not excite the paralyzed muscles to action, in which case we may have recourse to the galvanic current to the dormant muscles, interrupting the current by removing one of the electrodes and replacing it again quickly, or by changing the polarity of the current, the electrodes remaining intact, by means of the commutator, thereby giving a shock. When this treatment has roused the muscle to action, faradization of the limb may be resumed. Should the excitation of the muscle fail, after due trial, the case may be deemed well-nigh hopeless. The galvanic current, from twelve to twenty cells, should be applied to the spine for ten or fifteen minutes, three times a week, with faradization of the limbs.

The treatment must be resolutely persevered in for months and even years, if signs of improvement are manifest. It is well to discontinue the treatment for a month, after which resume it again. In this, as in many other important complaints, it is always best to have the advice of a physician, at least in the early stages of its application.

PARALYSIS FROM INJURY TO THE NERVES.

These troubles come on mostly from injuries or pressure of tumors upon the nerves. When the nerve has been but little injured, the muscles are only weakened, but where the nerve is severed, the excitability of the muscle is wholly lost.

In this form of paralysis it is best to defer the electric treatment until the nerve is about to unite again, which does

not take place usually for three or four months, and, in some instances, much longer. It will require several months of treatment to effect a cure in this form of paralysis. I usually apply electricity on alternate days, using the variety which seems to have the best effect upon the palsied muscles. Galvanism is generally the best, yet faradism, with the warm bath and shampooing, will be valuable adjuncts to the treatment. After using electricity for two or three months, it is well to discontinue the treatment for a month or so. Should neuralgic pains be developed, the treatment may be omitted for a time, though it is rather a favorable indication than otherwise. As a general rule in paralysis, when using the galvanic current, apply the negative above and the positive below. The secondary current of the faradic machine is often employed from its greater intensity of action. If after three or four months of treatment no signs of improvement are visible, the case is a bad one, yet perseverance may be crowned with success. Cases of paralysis from pressure, as the head resting on the arm in sleep, intoxication, or chloroform, are cured in most cases by electricity. *Paralysis* from the use of illy-made crutches may be treated by either galvanism or faradism to the arm affected; employed from five to ten minutes.

Paralysis after acute diseases—such as typhus, scarlet fever, erysipelas, diphtheria, etc.—are worthy of a passing notice in this connection. Both currents may be employed. Galvanization of the brain and spinal cord, when the paralysis arises from hemorrhage from those organs. When there is wasting of the limbs, galvanism only will be of service, long persevered in. Paraplegia is the most usual form this paralysis assumes; though, sometimes, a single set of muscles or a limb may be paralyzed. *Diphtheritic paralysis* is too frequently met with, and its pathology not well understood. But this much is known, that the brain

in some instances suffers from capillary apoplexy, thickening of the roots of the spinal nerves, etc.

From the above brief statement of the changes which take place in the spinal nerves and brain, it becomes evident that galvanism to the brain and cord is the treatment to be followed up persistently, with faradization of the limbs alternately. When there is loss of sensation, a strong faradic current should be used. If that fails to restore sensation, employ the wire brush as previously described.

FACIAL PARALYSIS.

Facial paralysis is an unseemly and troublesome malady, and frequently resists all forms of medication. Rarely is a case cured, which has existed much over a year, even by the electric current. Upon the accession of the deformity, faradize all the muscles involved separately, by means of a small, sponge-covered electrode for three minutes to each muscle, employing a moderately strong current. This is the most effective treatment, and should be repeated daily or every other day till relief is obtained.

There is another form of facial paralysis resulting from disturbance of the portio dura, which Althaus denominates *aural surgeon's facial paralysis*, caused by the reprehensible practice of injecting a strong solution of nitrate of silver into the external ear for the relief of deafness arising from aural catarrh. The deafness is not relieved, but paralysis of the portio dura is added. He further says, "It is fortunate for the poor patient that the physician's skill may remedy the harm done by the surgeon's recklessness." The continuous current, employed for two or three months, cures this form of paralysis.

PARALYSIS OF THE BLADDER.

Paralysis of the bladder may arise from a variety of causes, but it should be understood that every obstacle to proper micturition is not the result of paralysis. There may be an enlarged prostate, which impedes the flow of urine; there may be paralysis of the sphincter, and the body of the organ be in health.

We meet with paralysis of this organ in some brain troubles, hysteria, and in typhoid fevers; also from injuries to the spine and atony of the spinal cord, in which case we have paralysis of the motor nerves of the bladder, closing up the orifice and preventing the flow of the urine. This trouble is also induced by operations for piles, stone, child-bearing, etc.

When this difficulty arises from disturbances in the brain, apply the negative electrode of the continuous current battery to the back of the head, and the positive to the pubis, using a large sponge-covered electrode. When the paralysis comes on after injuries to the spine, place the negative to the diseased portion of the spine, and the positive above the pubis as before. When, as often happens, local causes produce paralysis of this organ, apply the negative low down on the spine, the positive to the pubis, or both electrodes may be placed above the pubis, intermitting the current every three or four seconds by lifting the negative and directly replacing it again, or by reversing the current by means of the commutator. Continue the treatment in this manner for five or ten minutes; using to the spine a current from twelve to sixteen cells; to the brain, a less number.

Micturition, or the frequent desire to urinate, is, in a great majority of cases, relieved by faradization. The bladder should be first emptied, then a gum catheter electrode, insulated to within an inch or so of its vesical extremity,

introduced into the bladder, and a rectal electrode into the rectum. The application may be prolonged for five or ten minutes, employing a moderate current twice or thrice a week. Incontinence of urine in adults and children, irritable and atonic condition of the bladder, are successfully treated by faradization.

INFANTILE PARALYSIS.

This, as its name indicates, is the paralysis affecting children. Commence the electric treatment as soon as the trouble is discovered, by galvanization of the affected limb before emaciation has set in. *Ordinary medication is of no avail.* Galvanize the spine by applying the negative to the nape of the neck, and the positive below on the spine, also in the same manner to the affected limb for five minutes, using a *moderate current.* It is best to alternate the currents; after having used the galvanic current for a time, omit it and faradize the part for a month or so. Immerse the limb daily in a warm bath as hot as the little sufferer can bear, for ten or fifteen minutes, then remove it, and rub with the hand or flannel for half an hour or more, after which wrap it up warmly in flannel. This manner of treatment should be persevered in if we would hope for success. Operate every other day.

SPINAL PARALYSIS (*Paraplegia*).

Loss of motion in the lower limbs results from paralysis of the spinal cord, from injuries sustained, or from affections of its lining membranes, or disease of the spinal bones. In this serious malady, especially if it is of long standing, little can be done beyond mitigating some of its more urgent symptoms. But when it invades the limbs after acute diseases, such as typhoid fever, flooding after child-birth, con-

vulsions, cold, a fall upon the back, fatigue from over-exertion, electricity almost always effects a cure. In these latter cases the remedy ought to be applied early. I apply the continuous current to the lower part of the spine, the positive above, and the negative below for five or ten minutes every second day, using from eight to twelve cells. Faradize the paralyzed limb.

RHEUMATIC PARALYSIS.

This is a common form of paralysis, and should be treated as follows: A strong current from the faradic instrument should be applied to the affected limb or part every day, from ten to fifteen minutes. I prefer the slow interruptions in this and every form of paralysis. This treatment should be persevered in until cure is effected. Guitard reports a case cured of three years standing where there was general emaciation and immobility. Althaus says: "I am convinced that every case of rheumatic paralysis can be cured by faradization, providing the muscles have not been too *extremely atrophied* and the treatment is not *too soon discontinued.*

LEAD PALSY.

Painters and compositors are mostly affected by this disease, but it may be produced in those who imprudently imbibe fluids impregnated with lead. Persons who use snuff incased in lead-foil, and those who use cosmetics containing this metal, are also liable to this infliction.

The muscles on the back of the arms, more particularly of the right arm, are most likely to suffer; the hand drops and can not be raised. The muscles waste and their contractility is partially or wholly gone, but sense of feeling retained.

Galvanization of the muscles is by far the best treatment;

place the negative above, the positive below, on the affected muscles, by moving the electrodes from place to place on the palsied limb and by changing the polarity of the current while the electrodes remain stationary on the part for ten or fifteen minutes. The faradic current may be used, but the galvanic is far better. Dr. Anstie cured a painter whose right arm and shoulder were almost completely wasted away. I would advise the use of both currents in extreme cases of lead poisoning, using one variety for a time, and then the other. It is not advisable to employ both currents at the same séance.

WASTING PALSY.

Physicians are not unanimous in their opinions as to the pathology of this disease; most of them, however, attribute it to disease of the antero lateral columns of the spinal cord. It may be partial or it may be general in its assaults. From a small beginning it is apt to spread until it affects the whole system. The partial form is not necessarily fatal, yet it is inclined to extend itself, involving the whole limb, and, at times, the entire body; the muscles waste; the gait becomes unsteady; paralysis supervenes, and death closes the scene. Medical treatment does little or no good, and treatment by the continuous current *alone* holds out the least hope of relief.

Apply the galvanic current from four to six cells to the sympathetic, the negative under the ear, and the positive over the seventh cervical vertebra, for five minutes, when both limbs are involved, galvanize the sympathetic on both sides of the neck, employing the current daily in the same manner for two or three months. Also apply the negative to the spine, the positive above, for ten minutes at each séance, employing eight to ten cells. Again, I employ the

current so as to stimulate both cervical ganglia, by placing the negative in the fossa under the ear and the positive on the top of the sternum, at the inner edge of the sterno-mastoid muscle, for five minutes on alternate days. Neither physician nor patient should too suddenly tire; the treatment must be persevered in while hope lasts.

CHAPTER VII.

Diseases of Nerves and Blood.

FACIAL NEURALGIA.

THERE are two varieties of this painful affection of the nerves of the face so commonly met with in these days of rapid locomotion; the one mild in form, and arises frequently from exposure to draughts of air, cold, sudden changes of temperature, diseased teeth, etc. This form yields readily to the electric stimulus. The other is a much more formidable affair, and is an attendant on advancing age and debilitated constitutions, and is too frequently an incurable disease; and all that can be done in most cases is to mitigate the sufferings of the patient. Various expedients have been resorted to, such as excision of a portion of the pain-stricken nerve; and now the experiment is being tried of stretching the nerve involved. This latter device I apprehend will prove as fruitless of good results as the old and scarcely less barbarous practice of excision. The least painful, and by far the surest remedy, is found in the use of the continuous current. On the painful or sensitive spot, or as near to it as the patient will tolerate, apply the positive, sponge-covered electrode, well moistened in tepid water, and the negative to the nape of the neck close to the head, commencing with two or four cells for a minute or two, without changing the position of the electrodes. After a brief period, should the pain continue, apply the electrodes in the same manner again. And here let me remark, that when the pain ceases, *stop* at once. Let well enough alone. It is time enough to repeat the dose when the pain returns.

The operator should be extremely careful not to use too strong a current upon the face. When a metallic or acid taste is perceived in the mouth, it is an indication ordinarily that the current is strong enough. Rarely should we use a current sufficiently strong as to produce flashes in the eye, or dizziness. In operating on the sympathetic nerve, which is sometimes of service in this form of neuralgia, do not, however, remove the electrode suddenly, for it is apt to produce dizziness, but gently slide the electrode to a less sensitive spot before removing it; this will prevent any unpleasant symptoms in the head. Repeat the operation every day or every other day, as the necessities of the case require. In some instances, especially when the pain is not relieved, a second and even a third application may be made the same day; but never allow one's zeal to overreach his judgment by using too strong a current or too long continued. *Short séances, with a mild current, do the most good.* We append the following case:

"Dr. Joseph Stead, of Manchester, reports the following case of facial neuralgia: 'The patient was a girl of twenty-four, and had been suffering from facial neuralgia of both sides for three months. For two nights previous to her visit to me, she had been compelled to get up from bed and come down-stairs and spend the night awake and in great agony. Five minutes' application cured one side of the face, and a second five minutes' application cured the other —and then, to my surprise, she fell fast asleep in her chair. There has not been the slightest return of pain.'"

CERVICO-BRACHIAL NEURALGIA.

This formidable neuralgic pain, affecting the nerves of the neck and arm, is most frequently relieved by the continuous current, so applied as to most effectually reach the

painful nerve, which is done by placing the positive electrode upon the chest under the collar bone at its outer extremity, and the negative in the hand, or, what is perhaps better, along the course of the nerve lying on the inside of the arm. A moderately strong current from twelve to sixteen cells for ten or fifteen minutes may afford relief in its worst forms. It should be repeated daily, or every other day at the farthest. The pain, however, is liable to return, as is the case in all neuralgias, and the séances should be continued until the patient is radically cured. In neuralgia, it is the almost universal practice to place the positive pole to the painful spot.

INTERCOSTAL NEURALGIA.

Neuralgia of the ribs and painful affections within the chest are relieved by faradization. Place one electrode (the negative, generally) on the nape of the neck, and the other to the painful spot for ten or fifteen minutes. As a general rule, the faradic current can be used for a longer time than the continuous, without injury.

ANGINA PECTORIS (*Neuralgia of the Heart*).

This dreadful disease comes on suddenly. The victim of its attack is seized unexpectedly with a distressing sensation within the chest, to the left of the sternum, or a sense of suffocation is felt; again he falls down and thinks he has fainted. At first the pain is located about the region of the heart, which spreads to the shoulder and arm.

Galvanize the pneumogastric, the positive being on the nerve, the other over the heart, for a minute or two, using a mild current. Galvanize the spine as well for five minutes, repeating these operations daily, or oftener if the symptoms are urgent. Dr. Poore reports a case improved

by applying the negative pole to the nape of the neck, and the positive over the heart and down the inner side of the arm.

SCIATICA.

This painful affection of the large nerve of the leg is of frequent occurrence. It is usually caused by cold, damp feet, and over-exertion of the limb. The nerve is sensitive to the touch; the pain is either acute or a dull, aching pain, extending from the hip joints to the heel, often preventing the sufferer from assuming the recumbent posture for days, and even weeks at a time.

It is my custom when the pain comes on instantaneously to galvanize the nerve; to accomplish which, I place the positive electrode to the lower part of the spine, at the hips, and the negative in the depression between the head of the thigh-bone and the bone on which we sit, for five minutes, with a current from six to eight cells, sometimes more, depending upon the sensitiveness of the afflicted nerve; when the pain is constant, apply the positive to the depression between the head of the thigh-bone and that on which we sit, and the negative on the back of the leg, just above the knee-joint, between the hamstrings of the joint or at the heel, for five minutes, employing a current from six to twelve cells, as the case may require. This should be repeated every day till relief is obtained. The treatment must be methodical and persistent.

I would recommend to physicians, in obstinate cases, to introduce the negative electrode into the rectum, after having unloaded it by an injection, and the positive to the lower part of the spine, for a few minutes, using a mild current; by so doing we reach the nerve more directly than by the previously described methods.

Should indications of paralysis supervene, faradize the muscles of the leg with a moderately strong current derived

from the secondary coil of the instrument for ten or fifteen minutes, but not so long as to tire the muscles.

LUMBAGO.

This troublesome complaint is characterized by a dull, aching pain at the small of the back, and is doubtless of nervous origin. It is often induced by over-exertion, from cold, sleeping in damp sheets, etc. It is next of kin to sciatica, and is most effectually treated by electricity, employed early. I recommend galvanism to the part affected, by placing the positive electrode just at the side of the spinal column or back-bone, and the negative low down on the same, using a current from eight to twelve cells, ordinarily for five minutes, electrizing alternately both sides of the spine. Again, apply the positive electrode by the side of the spine, and the negative a little removed in a direct line with the positive, and outward, for the same length of time, on both sides of the spinal column.

Faradization is also used, and in the same manner, employing a moderately strong current for ten or fifteen minutes. The treatment must be persistent.

MUSCULAR RHEUMATISM.

Rheumatism often resists every form of medication, as almost every day's experience demonstrates, exhausting itself seemingly with its own energy, and leaving its mark on the sufferer for a lifetime. On its first appearance, wherever located, it is well to use the faradic current (unless in acute inflammatory cases), not strong enough to be unpleasant, by placing one electrode on the seat of pain, and the other near by, allowing the current to flow from ten to fifteen minutes, or until the pain is gone; frequent applications are beneficial. It is good practice to use the electric hand, with moderately strong current, around and over the joints and

over the surface of the affected part, for fifteen to twenty minutes.

INFLAMMATORY RHEUMATISM.

In this form of rheumatism electricity in the acute stage of the disease is of little benefit. In the more chronic stage I have found galvanism to be of service in alleviating pain, in reducing the swelling, and in limbering the joints. I send the current through the joints from three to five minutes, and to the limbs apply the positive above and the negative below for the same length of time, using a moderate current.

CHRONIC RHEUMATISM.

Chronic rheumatism occasionally follows the acute form, and may be limited to a limb, joint, or it may be general. There is little or no fever, but a dull, gnawing pain is felt, increased on motion. The joints are inflamed usually, and swollen, with occasional contractions and rigidity of the muscles. It is not unusual to find deformities of the joints which resist every remedy but galvanism. I have found it invaluable in these deformities applied to the part affected, employing a current from six to eight cells, the negative above on the muscle, the positive below. If in a joint, I pass the current through it, using a current of the same force, the entire séance lasting not more than fifteen to twenty minutes. I use a mild faradic current to the limb for its tonic effect, when the muscles are flaccid and emaciated.

These deformities are improved under judicious and persistent treatment. When they are of long standing it is vain to look for a speedy cure; a few applications, while they may relieve pain, will not so readily remove the deformity of the joints; a systematic and persevering course of treatment is indispensable.

RHEUMATIC GOUT.

This affection of the joints is owing usually to malnutrition, and is peculiar to advancing age. Again, it arises from imprudent habits, inducing even in middle age senile decay.

Our object, then, should be, not to deplete, but to support the body. Therefore galvanism, from its acknowledged general tonic influence, especially upon the nerves, becomes a most important auxiliary to iron, strychnia, cod-liver oil, etc.

I not only apply the current to the affected joint, but so as to arouse the nerves, to improve nutrition, and stimulate all the important functions of the system; to accomplish which I apply the positive electrode to the back of the neck, and the negative to the pit of the stomach, employing a current from six to ten cells, depending somewhat upon the excitability of the patient, from three to five minutes. In this manner we act upon the base of the brain, spinal cord, and solar plexus simultaneously.

To the joints it is advisable to use a mild current from four to six cells for five minutes; the current should not be so strong as to be painful—the positive to the joint, the negative a little removed. This dose may be repeated daily in urgent cases.

CHAPTER VIII.

Disorders of the Brain and Spinal Cord.

As the brain is conceded to be the seat of the mind, so we conclude that disturbances of the understanding are the natural results of derangement of that organ. Whether or not electricity can cure, in a majority of cases of mental abberration, is not proven. It is nearly an untried field. Still we have the assurances of names such as Bischoff, Augustine, Aldini, Arndt, Hammond, Seguin, Janeway, and others, that it has been employed successfully in various mental disorders. I have found it invaluable in certain forms of emotional insanity, melancholia, hysterical mania, etc. And it seems rational enough that such should be the case, from the close resemblance of the brain to an electric machine; and produces a train of sequences so much resembling electricity, that some electro-therapeutists have come to the conclusion that they are formed on precisely the same natural principles, the brain being positive to the extremities.

Electricity, however, is contraindicated when the brain is overheated, or when suffering from inflammation, or any of its membranes. Faradism, from its known stimulating properties, will be found of service where anasthesia, atony, and cerebral depression are prominent symptoms.

Dr. Arndt, a noted German physician, has investigated this subject more fully, perhaps, than any other down to the present period. He seems to hold electricity in high esteem in insanity, and equally necessary as quinia, iron,

or baths, and more important than narcotics. He disapproves of faradization in melancholia where it is associated with fear of personal injury and persecution, etc.; in this form galvanization is the remedy. In what he calls the secondary forms of insanity, faradization also does harm, and in idiocy it produces fainting fits; in simple depression, however, it does a great deal of good.

I feel warranted in saying, that in most cases of insanity the continuous current is the remedy, applied not so much to the head as to the spinal cord and peripheral nerves, especially where the mental trouble follows some other disease. When there is general disturbance of nutrition of the system from any cause, benefit is derived from the continuous current by preventing changes in the structure of the part, and removing the cause of the mind trouble.

One of the causes, and the main cause why electricity has not done more good in the treatment of the insane, is to be found in the fact that the applications have not been systematic, and that those who have had the care of these afflicted ones have not been sufficiently critical in their selection of cases. The mode of applying electricity will be sufficiently explained when we come to speak of the treatment of special mental disorders.

HYPOCHONDRIA.

This form of mental depression is frequently relieved by the application of the continuous current to the brain, spinal cord, and sympathetic. To the brain employ a current from four to six cells for three or five minutes, the negative to the forehead and the positive to the back of the neck. If we would act upon the spinal cord, place the negative above on the spine, the positive below for ten or fifteen minutes, using a current from eight to twelve cells. To galvanize the sympathetic, apply the negative in the fossa

under the ear and the positive at the seventh cervical vertebra for three minutes, employing a current from two to six cells. Repeat the applications every other day.

When, as sometimes is the case, there is an imaginary or real disease of the organs of procreation, such as impotency, spermatorrhœa, the parts should be galvanized in addition to central galvanization. The reader is referred to the article on Spermatorrhœa and Impotency for further directions.

CEREBRAL EXHAUSTION.

The most prominent symptoms in this disease of the brain are irritability of temper, nervousness, impaired memory, drowsiness, faltering speech, loss of muscular power, palpitations of the heart, flushed face, etc.; these, however, are not all present in the same case. Cerebral exhaustion most frequently depends upon a diminished supply of blood to the brain, induced by anxiety, care, and mental depression. A variety of drugs have been administered: such as blue pills, iron, quinia, bromide of potassium, nitrate of silver, phosphorus, etc., all of which at times fail, and the intelligent physician will then, if not before, resort to the continuous current for a remedy.

It is the best treatment in most cases of this disease, to apply the negative above on the brain, spinal cord, and sympathetic, and the positive below, or on some peripheral part. This is not an invariable rule, however; the operator must be governed by the effect produced; if placing the negative above does not produce the desired effect upon the nervous centers, reverse the position of the electrodes, and should the patient not improve, it is best to discontinue the treatment.

When there is drowsiness in the daytime, apply the negative above, and the positive below for a few minutes daily, or every other day, reversing the position of the

electrodes if sleeplessness is a troublesome symptom. Dose, five to ten minutes to spine, three to brain.

CONGESTION OF THE BRAIN.

The earliest symptoms of congestion of this organ are wakefulness, disturbed and painful dreams, ideas confused, memory weak; indecision is a very prominent symptom; there are also illusions and hallucinations of the mind, transient and ever changing in character. Headache and *vertigo* are often troublesome symptoms, noises in the head, ringing in the ears, imperfect vision, etc.

Paralysis of a limb or all of the limbs follow and is more or less complete. These are but a few of the more prominent symptoms in this malady. It is not my purpose to speak of the drug treatment, but simply of galvanism as a powerful adjunct to general medication.

Galvanize the sympathetic by placing the positive in the depression under the ear, and the negative over the seventh cervical vertebra for two minutes or so, using from six to eight cells, for the purpose of contracting the blood-vessels of the brain, and thus lessening the flow of blood to the part; care being observed not to produce excessive vertigo. This operation should be repeated every other day until relief is obtained. When vertigo is a troublesome symptom, I apply the electrodes, one behind each ear or over the mastoid bone for a minute or two. Apply the faradic current to the paralyzed limbs every day, or every other day, as the case may seem to require.

ANÆMIA OF THE BRAIN.

In this brain trouble we have less than the normal quantity of blood, resulting from hemorrhage; vertigo being almost always an attendant symptom. The countenance is

pale, from loss of blood, pulse weak and frequent. Here, too, we have noises in the head and ears, the skin cold and clammy. Vomiting is present in severe cases, with convulsions. There is great weakness of the muscles, paralysis is either partial or general, with derangements of sensibility. The mind is weak, with hallucinations, low delirium, etc.

In addition to the usual medication, I can not too strongly recommend galvanization of the sympathetic, the *negative* in this instance to the nerve under the ear, and the positive to the seventh vertebra of the neck for two or three minutes every other day, employing from six to eight cells of the battery.

CATALEPSY.

The domain of catalepsy is referable to the brain and spinal cord. The victim of this malady is seized suddenly with loss of motion, sensibility, and mental volition. Rigidity of the muscles follows the above train of symptoms so completely at times, counterfeiting death itself.

The patient usually is cognizant of what is passing around him, but when the spell passes off, which it sometimes does in a few hours, the mind can not recall its sensations, nor can he tell what was transpiring during the seizure. There are, however, a few instances on record, where upon recovery the cataleptic was able to relate what he saw and heard. The most remarkable instance was that of the Rev. Mr. Tenant, of New Jersey, who, while in a cataleptic state, imagined himself translated to heaven, and upon returning to consciousness, related what he saw and heard. But he had forgotten even his alphabet and was obliged to re-learn it as a child. In his case there was ecstasy, I think, combined with catalepsy.

In this disease galvanism is an important remedy. Apply the current to the brain and spine for five minutes at a time,

the negative above, and the positive electrode below, employing eight to ten cells to the spine, a milder current to the brain for three minutes. Galvanize the sympathetic, the negative under the ear and the positive to the pit of the stomach, for five minutes.

ECSTASY.

Ecstasy, like its sister, catalepsy, holds sway over the brain and spinal cord, but, unlike her, the memory is not oblivious to what was passing in the mind during the attack. There is little or no rigidity of the muscles, but immobility is present; the eyes are fixed, the lips frequently parted as if about to speak, the hands uplifted as in the act of devotion. Extreme religionists, whose nervous systems are easily wrought upon, are liable to this affection. This phenomenon is occasionally witnessed at camp-meetings and other religious gatherings when there is an unusual religious excitement.

It is of rather frequent occurrence that ecstasy, catalepsy, chorea, and hysteria are conjoined in the same individual. In addition to drug medication, galvanism is an important remedy. I have been fortunate in relieving a few cases by electricity where other remedies had failed.

Galvanize the brain, spinal cord, and sympathetic alternately. Apply the positive above on the spine, the negative below for five minutes daily. To the sympathetic, place the negative in the fossa under the ear and the positive over the seventh vertebra of the neck for two minutes every day or second day. Employ a current from six or eight cells to the spine, and a milder current to the brain and sympathetic.

CONGESTION OF THE SPINE.

The symptoms in this disease are referable to the spine and the parts below. The pain in the back is usually dull,

increased by lying down, caused by an increased flow of blood to the spinal marrow. A sudden jar increases the pain. When the location of the disease is in the lower portion of the spine, the lower limbs are affected, the nerves of motion and of sensation are disturbed in their functions, and there is more or less loss of power in the limbs. Galvanism here is an important remedy. Place the positive electrode just above the diseased part of the spine and the negative just below it for ten minutes, using eight or ten cells, according to the sensitiveness of the patient. This disposition of the electrodes constricts the blood-vessels and lessens the flow of blood to the cord. Faradization of the paralyzed limbs is beneficial, using a current sufficiently strong as to cause contraction of the muscles, for ten or fifteen minutes. Give this dose three times a week.

Mr. G., of this city, officer of the Customs, came to me in February last, suffering from vertigo, intense pain in his back and thighs caused by a sprain of the back, some two years previously. For a time he was unable to walk or even stand upon his feet, but by degrees he recovered power over his limbs, and returned again to duty. Shortly after, while in conversation with a gentleman, he was suddenly felled to the ground from vertigo. From that time to the near present he has suffered more or less from vertigo, pain in the back, and sciatic pains, preventing him from attending to his office. He could not incline his head forward without causing intense pain down the spine, nor could he turn his head suddenly without producing vertigo, so much so that it was not safe to go into the street unattended.

I applied the continuous current to the brain, spinal cord, the positive above; faradized the limbs, and after five applications he returned to duty, and has not lost an hour since. Twelve applications were given in all.

SPINAL IRRITATION.

In congestion of the spinal cord, we had an increased determination of blood to the cord: but, in this instance, we have just the reverse; there is not enough. There is tenderness in some part of the spine increased by pressure. The spine, in some cases, is so extremely sensitive that it will not tolerate the touch of the clothing. In addition to well-directed medication, galvanism is a most important remedy. The application of the electrodes in this trouble is just the reverse of the former, for now our aim is to increase the flow of blood to the spinal marrow. Apply the negative electrode above the tender spot, the positive a little below, using a moderately strong current for five minutes. To remove the tenderness, we apply the negative over the sensitive spot, and the positive a little to one side for the same length of time and strength of current. The treatment may be repeated every other day.

SPINAL EXHAUSTION.

Weakness of the spine is a common complaint, especially with the young of both sexes who are growing fast. It also attacks those of maturer years. I am satisfied that no remedy equals galvanism in the relief of this affection. Apply the positive electrode on the upper part of the spine between the shoulders, and the negative below near by, from three to five minutes; then move the positive down a few inches, the negative still below, proceeding in this manner until the whole spine has been included in the treatment. Use the current from six to ten cells.

CURVATURE OF THE SPINE.

This deformity commences early in life, children of weak constitutions chiefly being the sufferers. It may come from

injury to the spine, but almost always from constitutional defects; scrofula, perhaps, being the most usual taint in the system. I have treated a number of cases with the most gratifying results by the use of the faradic current. I employ a moderately strong current, by placing one electrode to the muscles of the back opposite to the curvature, and the other below on a line with the first. Allow the current to pass for three to five minute.s It is beneficial to faradize the spine and the whole surface of the muscles of the back, by moving the electrodes up and down over them—the whole time occupying twenty minutes each day, or every other day. The above treatment should be commenced as soon as the curvature is perceived. In cases of long standing, in conjunction with the faradic current, I use the galvanic current every other day, by placing the negative electrode on the curvature and the positive below, allowing the current to pass five minutes from eight to ten cells.

ANÆMIA OF THE ANTERO-LATERAL COLUMN OF THE SPINAL CORD.

Paralysis of the lower limbs is the most prominent symptom in this spinal affection. The paralysis is only partial; the patient being able to walk, but with difficulty. Disease of the rectum and bladder often induces this affection of the spinal cord. Among the more common causes producing it, however, are exposure to cold, camping out on damp ground, etc.

The indications of treatment are to remove the cause, to improve the general health, and to promote the flow of blood to the part by increasing the calibre of the blood-vessels; to accomplish which we apply the negative electrode of the continuous current battery to the spine above the affected spot, and the positive below for four or five

minutes at a time, then move the positive up and down over the spine for ten minutes. I embrace the sympathetic in the treatment, also, by applying the negative to the fifth cervical, and the positive to the sixth dorsal vertebra for three minutes. Repeat the operation every second day. To the paralyzed limbs apply the faradic current for twenty minutes or half an hour—taking care not to fatigue the muscles by too strong a current or too long-continued.

LOCOMOTOR ATAXIA (*Posterior Spinal Sclerosis*).

Locomotor ataxia is frequently ushered in by an epileptic fit, vertigo, and ocular troubles. At other times it is more insidious in its attacks, pains in the back are felt, with sharp darting pains down the limbs, which may be mistaken for neuralgic pains. There is loss of sensation, mobility is affected, with derangement of the stomach and bowels.

As the disease progresses, insensibility becomes more marked. The patient feels as if his feet were cushioned; another as if he were stepping on pebbles, or other disagreeable substances. The gait is affected from incoördination of the muscles. This is a prominent symptom. The patient is unable, with any degree of certainty, to place his feet where he desires. He finds difficulty in ascending stairs, and in standing, especially with closed eyes.

The prognosis is not encouraging, yet under proper treatment, early employed, there may be hope. In addition to well-directed medication, galvanism is indispensable. If in the early stage of the disease there are indications of hyperæmia of the cord, I place the positive electrode above on the spine, while the negative is passed up and down the spine for ten or fifteen minutes, employing a current from twelve to twenty cells for the purpose of relieving the congestion. This operation may be repeated daily. When the

congestion has been overcome, or in cases in which it has not existed, apply the negative above and the positive below by moving it up and down on the spine for ten or fifteen minutes, using the same number of cells as directed above, daily.

In addition to the above apply the negative to the lower lumbar region, and the positive on the limbs over the sciatic nerve, five or ten minutes to each limb, employing a current of moderate strength.

In *Multiple Cerebral Sclerosis* galvanism is employed with great advantage, using a current from six to ten cells for three minutes, the positive to the forehead, the negative to the nape of the neck. Also apply an electrode to each mastoid process for the same length of time. The sympathetic should also be acted upon, using a current of the same intensity, and the same length of time, every other day.

Multiple Cerebro-Spinal Sclerosis should be treated with reference to the brain in the manner described for cerebral sclerosis. To the spine, however, a much stronger current should be employed, from twenty-five to thirty-six cells, in the same manner as described for posterior spinal sclerosis. The operation may be repeated every second day.

CHAPTER IX.

SPASMODIC DISEASES.

DISEASES of this class are less under electric control than paralysis. Still, in very many instances, electricity cures where all other remedies fail; therefore the practitioner who omits its use, leaves untried an important remedy. Both faradism and galvanism are employed; faradism to the skin and galvanism to the nerve centers and peripheral nerves. In diseases of this class we should be mindful of the excitability of the patient, and be careful not to employ so strong a current as to excite alarm, for this alone may induce a spasm and abort all our efforts; therefore begin with an *extremely mild* current and gradually increase it, as circumstances may seem to warrant. As a general rule in spasmodic diseases, we may prolong the séance beyond what is usual in paralysis. I refer more particularly to the use of the continuous current.

ST. VITUS' DANCE.

This annoying trouble is sometimes partial, affecting a limb and frequently the muscles of the face, and sometimes general, affecting the whole body. It is common to the young of both sexes. It appears more frequently, however, in girls. When it is general, use the faradic current, by placing the feet on a foot-plate and applying the other electrode to the back of the neck for three minutes; then the same length of time to the chest, stomach, and the whole length of the spine. After that, remove the feet,

and place both hands on the foot-plate and the other electrode to the back of the neck between the shoulders from five to ten minutes, using a current moderately strong. When it is partial, apply the faradic current to the part affected every day, placing the electrodes near each other; if to the face, apply the current mild. In obstinate cases, in conjunction with the above, use a mild current from the galvanic battery every day to the spine, placing the positive electrode above and the negative below; again apply the positive to the spine and the negative in a direct line outward from and near by the former. Use the current three minutes. It is beneficial in all cases to galvanize the sympathetic nerve, placing the positive in the depression under the ear and the negative to the pit of the stomach, using six cells for two minutes.

EPILEPSY.

Epilepsy is usually characterized by a spasm of greater or less severity, the patient falling unconscious to the ground. The symptoms are various, the subject usually having a premonition of the attack, such as sudden blindness, flashes of light, vertigo, pain in the head, etc. Nearly every drug known has, at one time or another, been employed for the cure of this affection. The mode of medication now, however, is pretty well established, of which it is not in my province here to speak, further than concerns the use of electricity. Faradization is of little benefit save in those cases induced through irregularities or suppression of the menstrual function.

Galvanization, on the contrary, is of service in a great number of cases. Apply the continuous current to the brain by placing the positive to the forehead, the negative to the back of the neck, or by placing an electrode on each temple, using a mild current for a minute or so. If to the

spine, apply the positive above, the negative below. In addition to this I would advise the early application of the current to the sympathetic in the manner so repeatedly described. Resort to this remedy upon the earliest indication of the disease, without reference to age. Call in your physician at once.

SCRIVENER'S PALSY.

Those whose occupation obliges them to write much are liable to this affection of the hand, compelling them to the disuse of the pen. Its pathology is somewhat uncertain. It is at the present time generally conceded to be a nervous affection, the seat of which is in that portion of the spine sending off nerves to the arm and hand, causing spasm of the muscles the moment an attempt to write is made. Mechanical contrivances have been used and all manner of embrocation employed without the least apparent effect; and the only remedy is found in the continuous current, which must be persevered in for months, or till the patient is relieved. Apply the negative electrode to the sympathetic nerve under the ear of the side affected, and the positive to the side of the spine, back of the neck, over the seventh vertebra. A moderately strong current should be allowed for five minutes, repeated every other day. In addition to the above, I usually employ a pretty strong current from twelve or fifteen cells, placing the positive in the hand and the negative between the shoulders, for ten minutes. This mode of treatment persevered in for a sufficient length of time effects a cure, the patient in the meantime refraining wholly from the use of the pen. Faradization is of little or no importance in this affection.

A Case of Scrivener's Palsy (*Reported by Althaus*).—James McC., aged thirty-eight. The patient had followed the occupation of clerk for many years, and had assiduously

worked at his desk for many hours in the day. Two weeks before I saw him he noticed an impairment in his writing power, and this consisted in an inability to write without the occurrence of a convulsive contraction of the extensors of his right forearm, by which the pen flew from the paper. This did not occur at the moment of writing, but after a few words had been written. He attempted to keep the hand steady by the influence of the will, but all his efforts were ineffectual. When he attempted to hold the point of any small object, such as a stick or pencil, against the surface, the same spasm would occur. There was no wasting of the muscles, pain, or other symptoms. I determined to try galvanism, combined with manual exercise, and the internal administration of strychnia in doses of one-twenty-fourth of a grain. Galvanism of the flexors of the forearm and of the small muscles of the hand was made, and, at the same time, the positive pole was held for a few moments at the nape of the neck. He was directed to procure the round of a chair with which to exercise. Galvanization was persevered in, although the progress was very slow. At first he could not write more than two words (almost illegibly); but, as he grew better, these spasms disappeared. Three séances a week, kept up for a period of about three months, effected such an improved condition that he was finally discharged at the end of that time.

TORTICOLLIS (*Wry-neck*).

This painful spasm of the muscles of the neck, causing the head to be inclined to one side, or, which is sometimes the case, backward, depending upon the muscles involved, is an obstinate and often incurable disease.

Electricity is the most effectual remedy we have. I have recently in this affection successfully used both currents, and in the following manner: To the contracted muscles I admin-

ister the continuous current by means of a flexible electrode attached to the *positive* pole of the battery *placed above* on the muscles, and the *negative flexible electrode below* on the muscles, or at the nape of the neck. These are fastened in their places by a bandage. Employ a current from four or six cells for five or ten minutes, simultaneously with the faradic current to the relaxed muscles on the opposite side.

Should it not be convenient to employ both currents at once, galvanize the *relaxed* muscles by placing the *negative above* and the *positive below* for five minutes, then to the *contracted* muscles apply the *positive above* and the *negative below* for the same length of time, employing a current from four or six cells, every day, or every second day. Faradize the relaxed muscles alternately for ten minutes, employing a moderately strong current.

HYSTERICAL PARALYSIS.

This happily is not of itself a fatal disease. It delights to attack sensitive females—young girls, and, frequently, women of more mature years. At times it comes on suddenly, and at others it creeps on unawares. Sometimes it only attacks a single muscle, at other times a limb, and then again the whole body. Hysterical paralysis is purely functional. The nerve-centers are in no way at fault. The patient complains of a something rising to the throat, pain and numbness of the skin, spasms and troubled menstruation.

Some patients get well without any treatment whatever, while others resist every form of medication. Electricity, however, usually cures if persistently applied; galvanization of the spinal cord, using the positive above and the negative below, where there is much excitability. When there is depression, place the negative above and the positive below. Use a current from eight to ten cells for five minutes

every day. When no galvanic battery can be obtained, the faradic current may be employed. Time of application, ten to fifteen minutes.

Althaus reports a case of long standing which arose from great mental excitement. The lady could not move from her bed. There was a feeling of numbness along the spine and lower limbs, with coldness. Both currents were used; and, after six weeks' treatment, could walk for half a mile. The treatment was continued, and the patient was restored to health.

ASTHMA.

Galvanization of the pneumogastric nerve, by placing the positive as directed when speaking of difficult deglutition. It is well to faradize the phrenic nerve, which is found on the front of the neck about the middle third from the ear to the collar bone. Here, too, it will be necessary to consult a physician. When the spasm is relieved, stop. This applies in all forms of disease, especially in this affliction and neuralgia.

TETANUS (*Lockjaw*).

Painful cramps and rigidity of the muscles are the marked symptoms in this disease. Galvanization of the spine as well as the muscles affected is the general practice of electro-therapeutists. Apply the positive to the top of the spine, the negative below low down, for five minutes; in the same manner treat the muscles of the limbs. Faradization is of little or no service in this complaint.

PARALYSIS AGITANS (*Shaking Palsy*).

This is a most intractable disease, especially when it attacks elderly persons. Tremor is the first symptom noticed usually, and it may be confined to a very limited space, or

it may embrace an extensive group of muscles or an entire limb. Though difficult to cure, it rarely terminates fatally.

The continuous current to the sympathetic nerve, spinal cord, and to the individual muscles affected, is the best treatment. I have so frequently referred to the method of electrizing the cord and sympathetic nerve, that it seems almost useless to refer to it again. Permit me, however, to say, as it is our purpose to tranquillize the excited nerves and to allay the tremor, place the positive above on the spine. Repeat the séance daily.

DIABETES.

Pathologists are not agreed as to the cause of this affection. Some allege the stomach to be the seat of the disease, others the fourth ventricle, and from my own experience, I am inclined to the belief that the vagus has much to do with the production and continuance of the disease, especially in the spasmodic form. The continuous current certainly does good in spasmodic diabetes. It is not always permanent in its effects, but it lessens the quantity of sugar as well as the amount of urine. It is my habit to galvanize the vagus by placing the negative electrode near the angle of the lower jaw on the carotid artery, and the positive to the top of the sternum for one or two minutes, repeated daily or more frequently if convenient, using a mild current.

CHAPTER X.

UTERINE DISEASES.

ELECTRICITY is successfully employed in the various diseases peculiar to females, and its importance can scarcely be overestimated. It seems to have a specific effect upon the vaso-motor nerves of the uterus and its appendages; as an emmenagogue, therefore, it is especially valuable. This does not seem so strange when we take into consideration its anatomical structure. The uterus consists of three layers of muscular fiber-cells, connected together by a mass of connective tissue, and so intermixed that it is next to impossible to separate the various structural tissues.

The uterus and appendages are subject to atrophy of its contractile fibers, to congestion, effusions, and increase of the substance of the organ, and electricity acts favorably by its stimulating properties, causing contractions of the muscular fibers, giving them tone and promoting the absorption of effusions, etc.

PROLAPSUS UTERI (*Falling of the Womb*).

In this painful and harassing condition of the womb, from whatever cause, the first indication is to restore it to its natural position and to retain it there, by removing the cause; to effect which, whether the trouble arises from congestion, inflammation, and consequent effusion into the substance of the organ, I employ galvanism, by means of an intra-uterine negative electrode, introduced into the womb, beginning with a mild current, from two to six cells

of the battery, for five or ten minutes, and the positive, armed with a large sponge-covered electrode, just above the pubis. This treatment may be repeated daily or every other day.

In addition to the above, it is well to faradize the womb and appendages by placing one electrode to the lumbar region, and the other above the pubis; or the intra-uterine electrode may be employed as directed above, and the other to the pubis, for ten minutes, using a mild current. Should there be ulceration of the cervix, apply a mild galvanic current to the ulcer by means of a metal disk attached to the negative pole of the battery, the positive above the pubis, for five or ten minutes, as the case may seem to require. Begin with two cells and gradually increase the current strength to the effective point, *always avoiding too strong a current.*

Mrs. M., of Westchester, N. Y., aged 28 years, was sent to me, having suffered for six years from prolapsus uteri. Countenance pale, occasional nausea, bowels obstinately constipated, pains in the lumbar region, groins, and extending down the limbs; uterus placcid, and nearly twice its normal size.

Applied continuous current to the womb by means of an intra-uterine negative electrode, the positive to lumbar spine, ovaries, pubis, and sciatic nerve, the entire séance lasting from fifteen to twenty minutes every day for the first five days, then every second day, and at the end of two weeks found herself so much improved that she returned home. The womb was reduced to nearly its natural size, bowels regular, and general health greatly improved.

DISPLACEMENTS OF THE WOMB.

Displacements of this organ formerly were treated by the use of sounds and pessaries, but electricity has in a great measure reformed this mode of treatment.

Anteversion and Anteflexion is treated electrically by faradization of the posterior wall of the womb. It is accomplished by introducing the positive electrode into the vagina, having previously passed up a speculum, and the negative into the rectum. The negative should be moved about during the séance to increase its exciting effect upon the womb. Use a mild current.

Retroversion and Retroflexion takes place after labor when the womb is large and lax. M. Tripier's method is to introduce an air-pessary into the rectum; he then puts one electrode to the mouth of the womb and the other into the bladder, or places a moistened sponge-covered electrode to the lower part of the bowels, just above the bone. Use a moderately strong current for ten minutes every other day.

AMENORRHŒA.

Electricity is an important remedy for restoring the menstrual discharge, and will always excite that function when the womb is capable of performing it. Next, after faradizing the womb (see chronic metritis), the best method is to apply one electrode to the bowels, low down, and the other to the small of the back. Frequently, when faradizing for other complaints, the menses are brought prematurely on. It is useful for young women whose monthly periods have not been fully established, and when from a chill it does not return. This is an important matter, and should not be neglected. Five to ten minutes is sufficient every other day.

LEUCORRHŒA (*Whites*).

A kind of catarrh affecting the mucous lining of the canal communicating with the womb. It is treated by introducing an electrode large enough to fill the canal, attached to the negative pole of a continuous current battery,

the positive to the lower part of the bowels for a few minutes, using a mild current daily, or every other or third day, as the case may require.

CHLOROSIS (*Green Sickness*).

In this ailment, mostly affecting young females, when it does not arise from structural disease of the womb and ovaries, the same treatment is to be observed as in amenorrhœa. In addition to the treatment I recommend general faradization (see general faradization); it is of special service in this disease, acting as a tonic and stimulant.

CHRONIC INFLAMMATION OF THE WOMB.

The continuous and faradic currents are used in the treatment of this disease. Faradization of the womb is effected by introducing into the uterus an intra-uterine electrode, and the other is applied to the small of the back or just above the pubis. Galvanization is performed in the same manner by introducing the intra-uterine electrode attached to the negative pole of the battery, the positive to the lower part of the back, two or three times a week; a moderately strong current may be employed from six to eight cells for five minutes. The womb is not over-sensitive to the electric stimulus.

DYSMENORRHŒA.

Both currents are employed in this affection. The same mode of treatment is resorted to as in amenorrhœa; the operation can be repeated daily until menstruation becomes easy and natural.

CHRONIC OVARITIS.

In chronic inflammation of the ovaries there is tenderness, and when strong pressure is made upon them, the stomach

becomes sympathetically affected, producing nausea and sometimes vomiting; pain is present, with a tendency to hysteria, etc.

The electrical treatment consists in the daily use of the galvanic current to the ovaries (if both are affected), by means of Dr. Murray's double ovarian electrode, or any bifurcated electrode may be employed, directing a current from eight to ten cells to the organs daily, using the negative pole of the battery, and a large sponge-covered positive electrode to the lumbar region for fifteen or twenty minutes. When but one ovary is diseased, apply an ordinary negative electrode to the part and the positive as before, and for the same length of time.

The treatment should be persistent.

DISEASES OF THE MALE ORGANS.

IMPOTENCY.

Impotence is most frequently induced by debauchery and reprehensible youthful practices. There is often anæsthesia (diminished sensibility) of the glands and prepuce, in which case the impotence disappears with the anæsthesia, treated by means of the wire-brush connected with one electrode of the faradic apparatus, and placed upon the insensible points for a minute or more, and the other to the lumbar spine or above the pubis, or a rectal electrode may be passed into the rectum, employing a mild current for five minutes. Again, it is well to faradize all the muscles of the organ. Faradism is also rendered effective by placing one electrode to the perinaerum and the other to the pubis.

In obstinate cases, and they are frequently met with, I resort to the continuous current administered in the following manner: A catheter electrode insulated, except at the

point, attached to the negative pole of the battery, is introduced as far as the verum montanum, and the other to the perinaeum; a current from two to six cells is allowed to pass from three to five minutes, taking care not to create excessive pain. When impotency arises, as it often does, from hypochondriasis, benefit will also be derived from the use of the wire-brush to the parts. Galvanism also may be employed by placing the positive to the perinaeum and the negative to the glands, dorsum, penis, and lumbar spine, using a current from eight to twelve cells, the entire séance lasting for five or ten minutes.

SPERMATORRHŒA.

These emissions may occur at any time, but most frequently during sleep. In most cases they are occasioned by youthful indiscretion. The brain and nervous centers become unduly and unnaturally excited, resulting in melancholia and frequently in insanity in its worst forms. I can not praise too highly the continuous current to the prostatic portion of the urethra, by means of a gum-elastic catheter electrode insulated to within about an inch of the terminal point, and attached to the negative pole of the battery, and the positive to the groin, from three to five minutes, employing a current from two to six cells, taking care not to cause pain during the operation, nor excessive irritation after. This operation may be repeated every third day. The positive electrode should in nowise be introduced into the urethral passage.

STRICTURE OF THE URETHRA.

Galvanization of the urethra has been employed for the relief of stricture by many eminent surgeons and electrotherapeutists, both in Europe and America. To Mallez and Tripier belongs the merit of systematizing the treatment.

The stricture is electrolyzed by introducing an elastic metal-tipped catheter electrode attached to the negative pole up to the stricture, using a current from six to eight cells; the positive sponge-covered electrode well moistened, is placed to the inside of the left thigh. The patient feels a slight pricking sensation, which diminishes as the part is electrized; push the point of the electrode forward gently now, to cauterize the entire length of the stricture. When the obstruction has been removed, a sound may be introduced without hindrance. It will not be necessary ordinarily to repeat the operation of electrolysis, but sounds may, from time to time, be introduced if necessary, to preserve or to increase the advantage gained by the electric current. *The negative pole only should be used to the urethra in stricture, the positive never.* Take special care not to use so strong a current as to produce pain; it is well to begin with a very slight current, and increase it to the point where the patient feels it, except in old strictures, when a stronger current may be employed, but not so strong as to produce excessive pain.

GONORRHŒA.

This affection of the urethra may be removed by three or four, and sometimes one, application of the continuous current, applied by means of a metallic electrode attached to the negative pole of the battery, employing a very mild current, in *no instance so strong as to produce pain*, for two or three minutes, the positive to the back low down. The electrode need not be introduced further than the prostate usually, never beyond the inflamed surface. The application may be twice or three times a week, giving time for the irritation, which is but trifling, to subside. Both acute and chronic diseases of this nature are cured in a most expeditious manner. It is as serviceable here as in fluor albus. Chronic gleets are effectually cured in a brief period in

this manner. Less danger attends this treatment than from the indiscreet use of injections, and cures in one-fourth the time.

SKIN DISEASES.

It is the prevailing opinion among dermatologists that diseases of the skin are, for the most part, a neuroses, and are best attacked by electricity. It is a well-established fact that very many of them arise from a morbid condition of the nerves supplying the skin, and that galvanization of the spine and sympathetic will more readily influence the peripheral nerves than any other form of medication. Local applications of the current, however, are sometimes a necessity.

PSORIASIS.

This disease makes its appearance upon different parts of the body in irregular patches of various sizes. At times, however, it is diffuse, the margins are raised and inflamed, the surface under the scabs are extremely sensitive, and the skin broken by deep fissures, which discharge when the inflammation runs high, forming extensive scabs. It is my usual practice to apply the positive electrode to the nape of the neck, and the negative to the spot affected, using as strong a current as can be well borne for two or three minutes to each spot every other day. Lepra may be treated in a similar manner, which it much resembles.

ECZEMA.

This eruption of the skin is attended with itching, sometimes with a painful inflammation. The discharge from the vesicles is watery, which concretes into scabs or crusts. I usually apply the negative to the sympathetic under the ear, and the positive to the parts affected for five or ten minutes, using six to eight cells, two or three times a week. This will ordinarily effect a speedy cure.

PORRIGO.

This is a contagious disease affecting mostly infants. It makes its appearance on the face and forehead in the form of pustules, matter is discharged, which concretes into scabs. There is a more formidable form of the disease attacking the scalp; scabs form, the hair falls off, presenting what is commonly known as "scalded head."

Both forms of the disease are treated by the continuous current. The part should be kept clean, and the scabs removed by a poultice. Cover the positive electrode with flannel, well wet in tepid water; this is applied to the part, the negative in the hand or to the back of the neck for two or three minutes, employing a mild current, interrupted by the rheotome, every other day.

PRURIGO.

This affection is attended with an intolerable itching. Apply galvanism to the part, the negative is preferable, and the positive near by, using a current from six to ten cells for five minutes. This complaint frequently arises from being overheated, wearing too much clothing, and from indigestible food, especially in old age.

HERPES.

The vesicles appear in irregular clusters, and in quick succession, with an inflamed base, with deep-seated pain, and more or less constitutional disturbance. Both currents are employed at times, but I give the preference to the continuous. Apply the positive to the part affected, the negative near by; also the positive to the back of the neck, the negative to the pit of the stomach, for three or five minutes, using six or eight cells. Other skin diseases are treated in a similar manner.

CHAPTER XI.

ELECTROLYSIS AND GALVANO-CAUTERY.

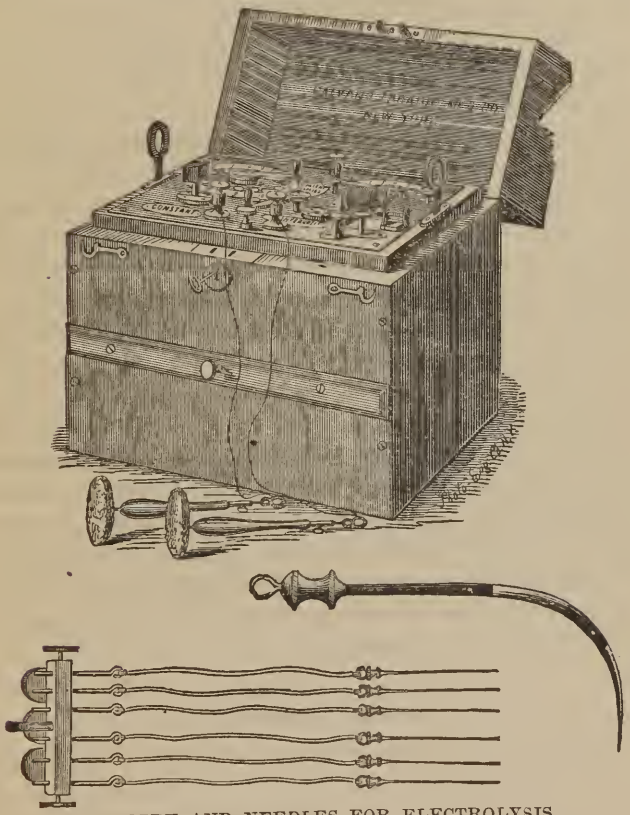
The engravings on the opposite page represent a galvanic battery and various styles of needles generally used by physicians in removing tumors, nævi, etc.

About the year 1800 Carlysle discovered that the galvanic current would decompose water, oxygen appearing at the positive pole and hydrogen at the negative. If albumen be subjected to electrolysis by means of needles attached to both poles of the battery, at the negative there will be collected a clot consisting of particles of albumen. If blood be operated upon in like manner, a clot will be formed at *both poles*, owing to the different constituents of the blood.

Electrolysis, then, means the *electro-chemical decomposition of matter*, fluids, however, being more readily affected than solids. This process is most frequently performed by the introduction of needles insulated to within a certain distance of the point, depending upon the part to be acted on. If a tumor is to be discussed, two or more needles are introduced, attached to the negative pole and the positive close by, but not touching. Commence with a gentle current, gradually increasing to the desired strength. A moderate current kept up from half an hour to an hour, or more, is the best mode of treatment.

Dr. H. Tibbits, of London, substitutes for the needles thin sheet of copper, about the thickness of paper, moulded to fit the entire surface of the tumor. He covers the copper with flannel, and fixes it by a binding-screw to the conductor of the negative pole of the battery. The flannel,

before using, is to be well soaked in solution of salt in water and applied to the tumor. Place the positive pole with a well-moistened sponge electrode as near by as possible



BATTERY AND NEEDLES FOR ELECTROLYSIS.

without touching, and allow as strong a current as the patient can bear without pain to pass from twenty minutes to an hour, daily or every second day. He treats ganglionic tumors and nodosities of the joint in the same manner.

ANEURISM.

The effect which galvanism has upon the blood has led to its employment in this formidable complaint. It is not, however, unattended with danger; so are, indeed, nearly all our appliances for its cure. It should be resorted to when the aneurism is within the chest, and death is imminent from rupture of the artery.

The practice is to introduce two or more steel gilt needles, well insulated, into the sac, attached to both negative and positive poles of the battery, beginning with a gentle current, increasing it gradually to the desired strength, employing from five to twenty cells, as the case may require. Fifteen to twenty minutes is usually long enough for the first application. We must be governed, however, by circumstances. If short séances have not the desired effect, we may prolong the action of the current for an hour and even longer, if necessary, to produce a firm clot within the sac. The pain attending this operation, using a strong current, is intense; on the contrary, if a gentle current be employed the pain is slight, and, as a general rule, it is not necessary to administer chloroform. When it is desirable to use a strong current, the patient must be put under its influence. Aneurisms occurring on the limbs are most safely treated by galvano puncture.

FIBROID TUMORS.

Ovarian cysts are successfully treated by electrolysis; and this method of disposing of them is fast growing in favor with the profession. It is preferred to ovariotomy, especially when the cyst is unilocular; on the contrary, when there are a number of cells composing the cyst, ovariotomy, by some electro-therapeutists, is deemed preferable.

The operation consists in introducing two or more nee-

dles into the cyst (depending much upon its size, however, and as near to its base as possible), attached to the negative pole, by means of the serres-fines, and the positive is applied to the surface, using a metallic disk, or a needle may be introduced into the center of the cyst, allowing a current from twelve to twenty cells to act upon the part for twenty-five or thirty minutes every third day. Care should be observed in introducing the needles to penetrate the tumor; for it would be pitiful to torment the patient uselessly by missing it; this has happened, therefore the caution.

Recurrent fibroid tumors are treated much in the same manner, employing a current from fifteen cells or more, if necessary, to make a decided impression upon the tumors, and the operation lasting (in the judgment of the operator) from fifteen to twenty minutes. Repeat the operation three times a week.

CANCER.

Every variety of cancer derives more or less benefit subjected to electrolysis. It removes the tumor, aids the nutrition of the part, and prevents a relapse of the disease. Even in cases of long standing, in which the poison affects the entire system, and there can be no *reasonable* grounds for hope of recovery, *it relieves pain and renders life more endurable.*

Mr. Lewsen Tait records a case in point of encephaloid cancer of the femar, treated by electrolysis, with marked success in relieving pain. The patient, he says, "habitually took from sixty to one hundred grains of hydrate of chloral, and had twenty-four grains of morphia injected subcutaneously every twenty-four hours, besides inhaling chloroform occasionally; but after two electrolytic applications, she was for four days absolutely free from pain." The patient, however, died of irritative fever. That electrolysis is the best means of relieving the pain of cancer, is a settled point.

Epithelioma is successfully treated by electrolysis, with both poles in the tumor. Professor Groh has treated eighteen cases, thirteen of which were cured, the others more or less benefited. Most electro-therapeutists agree that every case of cancer may be cured by electrolysis, if resorted to early, while the disease is local. Electrolysis has the advantage over excision and cauterization in that it destroys the tendency of the disease to relapse, by destroying the poison beyond its local or primary seat. The practice is to commence the treatment by introducing the needles once or twice a week, until a decided impression is made upon the cancer, followed by percutaneous treatment, with a mild current continued for months.

HYDROCELE.

Galvano-puncture is successfully practiced in this disease. One or two needles attached to the negative pole are introduced into the sac of the tunica vaginalis containing the fluid, taking care that the needles do not touch. Ten to fifteen cells are generally sufficient. Place the positive upon the groin of the same side. The current may be allowed to pass for ten or fifteen minutes. The serres fines electrode fixed to the negative pole is the most convenient form of employing the needles, which should be small and not more than two inches in length, and well insulated, so as to protect the skin from injury.

GOITRE.

The treatment of these swellings of the neck electrically is of the utmost importance, from the fact that it is hazardous in the extreme to remove them with the knife, and drugs are of no use whatever.

The simplest mode of treatment is to apply the galvanic current from twelve to sixteen cells every second or third day

to the tumor by means of sponge-covered electrodes; the positive on one side of the tumor, and the negative on the other, for ten or fifteen minutes.

The most effective treatment, however, is to introduce two or more needles into the cyst, depending somewhat upon the size, attached to the negative pole, the positive near by, employing a current from twelve to twenty cells for ten or fifteen minutes, and even longer if necessary. This operation may be repeated twice a week. The patient may be anæsthetized, especially in weak and enfeebled constitutions. Medication is wholly useless; it will never remove the swelling.

Dr. Bartholow, of Cincinnati, has adduced several cases cured or greatly benefited by the use of galvanism.

Tumors frequently appear on the face, and ladies of great personal beauty have their appearance marred by them. These may be removed in the same manner, and no tell-tale mark is left.

NÆVUS, OR MOTHER'S MARK.

These unsightly discolorations of the skin are in most instances effectually removed by introducing into the base of the tumor a number of small insulated needles, quite near to each other, attached to the positive pole of the battery, and the negative sponge-covered electrode near by. A mild current is employed until the blood in the tumor coagulates. When the diseased part becomes firm and hard to the feel the needles may be withdrawn. Apply cold water dressing.

I quote from Dr. Butler's experiences in galvano-surgery:

"In operating upon nævus, a number of fine insulated needles should be inserted into the base of the growth parallel to each other, and about a quarter of an inch apart. These should be connected with the battery so that every

alternate needle is connected with the positive pole; the remainder with the negative; a mild current should be allowed to flow until the blood in the growth becomes coagulated. This result may be known to have taken place by the tumor becoming hard and inelastic. The needles may then be withdrawn. It is only very rarely that even a drop of blood exudes. Cold water dressing is the best application.

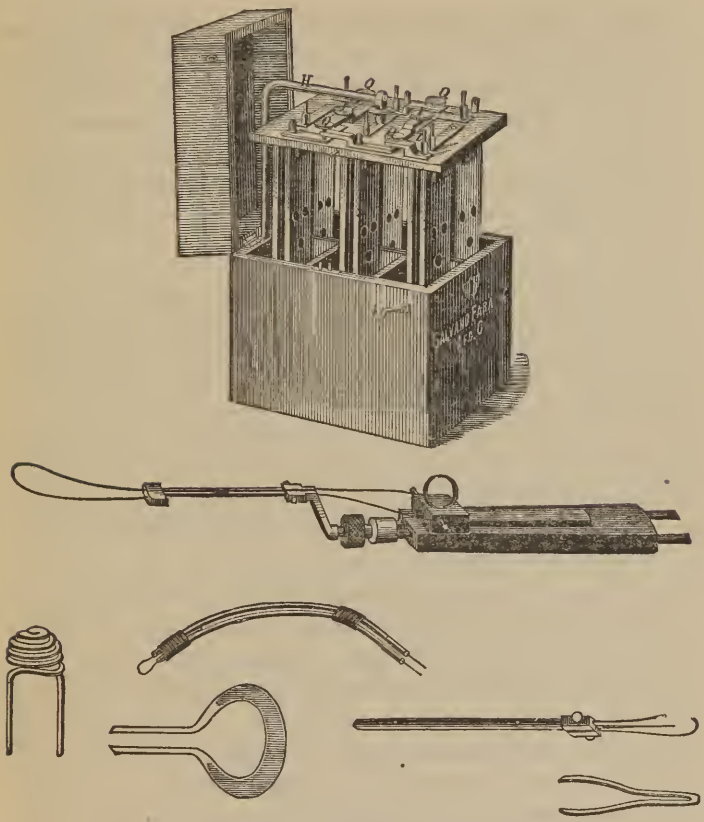
"Case III.—May, 1873. J. W—, a boy, aged 12. Nævus on lower eyelid. Operated as above indicated by means of two needles, one from each pole of the battery, transmitting a current from six Stöhrer elements for five minutes. A coagulum formed, which dropped off six days afterward, revealing a small portion of the nævus that had not been acted on by the current. I immediately performed a second operation, which entirely removed all traces of the growth. No cicatrix left."

Cases might be multiplied *ad infinitum* of cures effected by electrolysis and galvano-puncture, but I deem it useless labor. It is the surest and safest remedy at our disposal.

Varicose veins are also treated by electrolysis and the cautery. Needles are introduced into the enlarged vein after the manner described for aneurism.

Another, as recommended by Dr. Piffard, is to bring a platinum knife or wire, raised to a white heat by electricity, nearly in contact with the vein, and held there for a minute or two; the result will be a blister upon the surface, and obliteration of the vein will speedily ensue. This is, doubtless, the safest method of the two. It has a decided preference over the method of cutting down to the vein, passing the platina loop around and severing it.

Moles, warts, and other abnormal growths are best treated by electrolysis.



GALVANO-CAUTERY BATTERY AND ELECTRODES.

The Galvano-Caustic battery may be used to advantage to sever diseased growths from the contiguous healthy tissue, to cauterize unhealthy ulcers, sinuses, etc., and to amputate such parts as the tongue, cervix uteri, and other parts which can not be conveniently reached by the knife, and where a bloodless operation is desirable, also in operating on pedunculated tumors in the uterus, larynx, pharynx, etc.; hæmor-

rhoids; sinuses, fistulæ, lupus, etc.; nævi, condylomata, etc.; hemorrhage from vessels that can not conveniently be ligatured; and the malignant growths which, from location or otherwise, it is not desirable to destroy by electrolysis.

GENERAL RULES IN OPERATING WITH THE GALVANIC CAUTERY.

I quote from C. T. Deane, M.D.:

"1. A good battery is indispensable.

"2. Be sure, by a thorough examination *yourself*, that the battery and instrument are in proper order, and will work correctly, so as to cause no confusion or delay while the operation is in progress.

"3. Be provided with one or more platinum wires besides the one connected with the instrument.

"4. The contraction of the loop being controlled by the screw, should, in all cases, be slow and gradual, yet interrupted so as to insure a perfect cauterization of each stratum as it passes through. The speed with which the screw is turned is of great importance, so far as the prevention of hemorrhage is concerned, and the best rule to follow is, the greater the vascularity and liability to hemorrhage, the slower the speed, and *vice versa*.

"5. Toward the close of the operation, and as the circle of wire becomes smaller, the current of electricity should be proportionally decreased.

"6. Traction on wire should be carefully avoided until it has passed well into the sub-mucous tissues.

"7. The wire loop should never be brought to a white heat when passing through superficial tissues. The current is to be controlled and moderated so as to heat the wire red, this being more desirable as the tissues are more thoroughly cauterized, thus lessening the probabilities of hemorrhage. The cautery loop is to be introduced while cold, and made

to embrace the cervix. The loop is then moderately tightened, and the electric circuit completed, little or no contraction of the loop being effected, so that the superficial tissues are thoroughly cauterized. When the wire has entered the structure to a sufficient depth, firm and steady traction is made by means of a vulsellum or tenaculum and the intervening tissues slowly severed by further contraction of the loop. By such proceedings, the surface from which the parts are removed will present more or less of a concavity, and very similar in appearance to a raw potato cut in half by a rusty knife. There will not be the slightest hemorrhage whatever, and the operator, if he desires, may apply a simple dressing of cotton saturated with glycerine to the exposed surface. The after treatment does not differ from other operations of this nature—no opium being necessary, as there is no pain unless the sides of the labia may accidentally have been burned. Perfect rest should be enjoined for a few days, no motion of the bowels being allowed, and the urine taken away with a catheter. If an examination be made after a few days, the surface will be found to be covered with healthy granulations.

"Out of a series of sixty cases demanding amputation of the cervix uteri operated on by Simon, five (5) terminated fatally. I have operated nine (9) times without losing a case."

HÆMORRHOIDS, OR PILES.

There are not less than four forms of this troublesome and sometimes severely afflictive disease. In the simplest form of the complaint there exists merely an enlargement of the veins of the part, with a slight thickening of the mucous membrane. Again, there is an effusion of blood into the sub-mucous tissue. Then again, we have a fungus growth of the lining membrane of the bowel, or a prolapsus of the

same, which becomes thickened and hardened. These last two forms of the disease may be removed readily without serious pain and no loss of blood by galvano-cautery, by means of the platinum wire loop, or they may be cauterized when the former operation is not practicable. The first step in the operation is to unload the rectum by an injection, paralyze the sphincter by stretching it with a proper instrument, previously having anæsthetized the patient; if the pile is not external it must be seized with forceps and gently brought down, the loop applied tightly around it, the current let on, gentle traction made upon the loop, and the pile is at once severed. Should the pile simply be a thickening of the membrane, it may be destroyed by cauterizing it with a pointed instrument; to do this, I introduce a valvular speculum, heat the cauterizer to a white heat, and touch the part affected and no other, taking care not to burn the parts by actual contact or radiation. This is the simplest and most effectual method of treating internal hæmorrhoids.

Fatty tumors are not amenable to electrolysis, but should be excised by means of the wire loop, where it is possible to do so.

Polypus of the nose, vagina, uterus, and rectum are speedily removed by the galvano-cautery. It is not my purpose to make this subject exhaustive, but merely to call the attention of the profession to its importance, hoping that they may be induced to discard the knife in cases at least in which the cautery has proved its superiority.

I append the following important paper published in the Charleston, S. C., *Medical Journal* January 7, 1877, by Prof. H. G. Piffard, M.D., of New York:

"If the employment of a remedial agent, or method of treatment, is attended with much inconvenience or expense,

its general introduction and adoption is apt to be tardily accomplished, no matter how valuable the remedy or method may be. This is peculiarly true of the actual cautery. Passing by the time when the hot iron was used as a hæmostatic, anterior to the introduction of the ligature, we find that the actual cautery was principally confined to the following applications: First, the destruction of small vascular growths, as nævi upon the face, etc.; second, of cancerous growths upon the neck of the uterus; third, as a means of counter-irritation over the larger joints when diseased, and along the spine in certain affections of the cord, etc. The practical difficulties in the way of a successful use of hot irons were mainly due to the fact that the metal began to cool, and to cool rapidly, the instant it was withdrawn from the fire, and consequently, if the operator desired to employ the heat at a particular temperature, he was obliged to manipulate with a rapidity that was inconsistent with proper care. The importance of maintaining and using a temperature appropriate to the particular operation on hand, must not be overlooked; a fact of which the following case affords an illustration: A young gentleman having suffered for some time from an intense neuralgia, and having tried various methods of treatment without relief, consulted an eminent physician of this city, who recommended that an iron heated to whiteness should be applied at a certain point in the course of the affected nerve, and sent the patient to a well-known surgeon to have the operation performed. The latter applied the iron, not at a *white*, but at a dull barely red heat. The application was exceedingly painful, afforded very little if any relief to the neuralgia, and was followed by an extensive slough, and an ulcer, which for weeks had refused to heal. In this latter condition he came under my care, having been sent by the physician first alluded to. If, now, *white* heat had been employed, the probabilities are that the

operation would have been very much less painful, the slough would have been smaller, the ulcer would have cicatrized immediately, and the scar would possess far less of the retractile character which is displayed by cicatrices resulting from burns at a comparatively low temperature, as those from burning clothes or boiling water, the scars from which so often produce serious deformity. Now, the temperature of boiling water can not exceed 212° F., and that of burning clothes may not be much greater, but white-hot iron or platinum possesses a temperature above 1,000° F.; and experience shows that the effects will vary greatly with the degree of heat employed, a fact which must always be borne in mind in cautery operations. In certain operations a white heat is not desired, as a dull heat will better fulfill the special indications. We should therefore well consider the temperature best suited to the particular case, and should possess the means of maintaining and controlling it. The difficulty of accomplishing this with the blow-pipe or furnace as the source of heat, greatly limits the use of the ordinary cautery irons.

"Twenty years ago Middledorff brought into prominent notice another method of generating heat for surgical purposes, namely, by the aid of electricity. By this means he obtained perfect control of the temperature, but the apparatus was expensive and cumbrous. The consequence was that galvano-cautery was rarely used, except imperatively demanded, and many useful applications of the method were neglected or replaced by less efficient means of treatment.

"With convenient, efficient, and cheap instruments, there is no longer any excuse for neglecting the actual cautery when indicated; and there is no doubt but that its useful applications will rapidly multiply. Having for several years been satisfied of the advantages to be derived from the actual cautery in proper cases, I have been enabled, since

the advent of convenient instruments, to employ it somewhat extensively in connection with the treatment of certain cutaneous affections; in part, repeating the operations of others, and, in part, devising fresh applications of the method. The principal affections of the skin in which it has been found of service will be mentioned below.

"*Rosacea.*—In the *second* stage of this affection we frequently find the veins of the nose, more especially those of the alae, greatly distended, and more or less varicose. An important step in the treatment of this affection is obliteration of these enlarged veins. This may be effected in various ways: by division of the veins with a suitable cutting instrument; by injection of coagulating substances, or by the actual cautery. This latter may be accomplished with a platinum wire heated by a spirit lamp, or better by means of a small battery. For this little operation the two cells of an ordinary induction machine will generate sufficient heat, provided a quite fine wire is used. The vessel to be operated upon should be just touched with the wire heated to whiteness. The result will be obliteration of the vessel, reduction of a good deal of the congestion and infiltration around it, and ultimately a minute punctate scar, the size of which will depend upon the care and delicacy with which the operation is performed. In the *third* stage of this affection, characterized as it is by great hypertrophy of the parts, the actual cautery has been satisfactorily employed by RICHET.* In this case the heated wire should penetrate the whole depth of the thickened integument at several points. The result will be shrinkage of the parts and lessened deformity.

"*Varicose Veins.*—I have in several instances secured obliteration of enlarged veins of the lower extremity by

* L'Ignipuncture, etc., par TRAPENARD. Paris, 1873.

bringing the white-hot platinum (heated by electricity) *almost* in contact with the vein. The platinum should not quite touch the skin, and should be held in position for a minute or more. The immediate result will be a blister upon the surface, and ultimately obliteration of the lumen of the vessel, and a pigment spot, more or less permanent, upon the integument.

"*Angioma.*—I here refer to the little blood-red vascular elevations, whose size rarely exceeds that of the head of a match. They are frequently, in fact generally, multiple, existing upon the face and elsewhere to the number, some times, of twenty or thirty. A fine wire well heated is the neatest and quickest method of disposing of them.

"*Nævus Vascularus.*—The purely superficial capillary nævus (wine-mark), if quite small, may very properly be treated by the galvano-cautery, delicately applied. The solar cautery has also given good results in the same. Extensive 'wine-marks,' however, demand other treatment; Squire's scarification method being probably the best. If the nævus, instead of being purely capillary and superficial, is composed of vessels of some size, and is located in the subcutaneous tissues as well as the skin, or if it projects above the surface, actual cautery is an effective method of treatment, whatever be the size of the lesion. These nævi are usually treated by injection, ligature, electro-puncture (electrolysis so-called), caustics (potasa fusa, etc.), or actual cautery. If cautery is selected, the instrument should be heated to a *red* heat only, introduced and kept *in situ* some little time. If *white* heat were employed there would be considerable danger of hemorrhage. If the instrument is inserted perpendicular to the surface of the nævus, a cicatrix corresponding to each puncture will result. When, however, the nævus is considerably elevated, the best way of operating, in my judgment. is to make a small incision or puncture with a

scalpel, just through the skin at the edge of the nævus, then introduce galvano-cautery wire cold, close the battery circuit, and let the wire heat gradually, taking care that no more heat is employed than would suffice to redden the wire in the open air. When this is attained, open the circuit and carefully withdraw the wire. By this method of operating there will result coagulation of the blood and destruction of the vessels to a considerable extent around the wire, and very little risk of hemorrhage. The skin outside the nævus should be protected at the point of puncture by means of asbestos. In general, however, I think electro-puncture (with the positive needle only) preferable to cauterization in the treatment of nævus, as when properly performed less scarring results.

"*Lupus.*—In the severer forms of tubercular, ulcerative, and rodent lupus there can be no question that actual cauterization (where excision is impracticable) is the most satisfactory method of treatment, and is to be altogether preferred to the potential caustics. In several of these cases the results have been extremely gratifying. There is, however, another form of lupus, called by Kaposi the orbicular variety of erythematous lupus, which in an advanced condition is characterized by a ring of infiltrated tissue, enclosing a portion of skin, reddened and perhaps thinned, but not accompanied with ulceration. The tendency of the affection is to extend centrifugally, and to result in atrophy of the portions of tissue involved. The therapeutic indication is to check the extension of the lesion. This may be effected by applying a fine white-hot wire along the outer edge of the infiltration, and burning through the whole depth of the skin; the resulting circular cicatrix will form a barrier across which the lupus infiltration will not extend, and the final result will be a white depressed scar corresponding to the whole of the surface that has been invaded by the disease.

"*Epithelioma and Cancroid.*—Epithelioma of the lower lip, when the lesion is exuberant and forms more or less of a tumor, is most conveniently removed by excision; but when the lesion is ulcerative and depressed, and without much peripheral infiltration, the actual cautery white-hot appears to me preferable. In treating cancer and lupus in this way the cauterization must be thorough; mere scorching of the parts will not answer. The diseased tumor must be *destroyed*, otherwise the cautery will act as a stimulant; and upon the shedding of the very superficial slough, morbid action will be renewed, and the patient be injured rather than benefited by the operation.

"*Ulcers.*—I have on several occasions beneficially modified indolent and ill-conditioned ulcers by cauterization at a white heat.

"*Cancroids.*—It is in this affection especially that the actual cautery has given me remarkably good results. One good white-hot cauterization being sufficient to destroy the virulent properties of the sore, and upon fall of the slough to leave behind a granulating ulcer with tendency to heal. This method materially shortens the time of treatment, as I have elsewhere shown.* A few experiments satisfied me that the indurated *chancre* is not beneficially influenced by the cautery.

"*Venereal Warts.*—The most effectual treatment of these is to snip them off with scissors, and to touch the bleeding bases with the red-hot wire. This stops the hemorrhage, and effectually prevents the return of the original trouble.

"*Pediculated Tumors of the Skin.*—Amussat† has several times removed pediculated tumors from the skin by means of the galvano-caustic loop or knife. The only object

* Archives of Clinical Surgery, November, 1876.

† Memoires sur la Galvano-Caustique Thermique. Paris, 1876.

of using the cautery in cases of this sort is the avoidance of hemorrhage, or of *sepsis* in a crowded hospital ward, otherwise cold steel would be preferable. Personally I have removed but two pediculated tumors by cautery. One was a lobulated tumor the size of a pigeon's egg, removed from the right labium majus, and the other was an enlarged *preputium clitoridis*, which, after removal, was found to weigh between six and seven ounces.*

"*Circumcision* and division of the prepuce in the mediodorsal line have occasionally been effected with the cautery loop or knife, but not by myself, as I have not yet met with a case in which the operation appeared justifiable. I can conceive, however, of its being suitable and proper, if circumcision is imperatively demanded in the presence of a sub-preputial cancroid, the latter being also thoroughly cauterized at the same time.

"In making delicate applications where but small points only are to be touched with the glowing metal, the eyes of the operator should be guarded with blue-glass spectacles, otherwise the intense glare will prevent a distinct view of the point to which the application is to be made. In using the solar cautery, this is specially important.

"The above are the principal applications of the cautery in cutaneous surgery as yet developed, and the present article is intended to be suggestive rather than exhaustive. The increasing employment of the actual cautery in general medicine, surgery, and gynæcology, is due in part to the increased facilities for its use, and in part to a growing belief in the truth of Hippocrates' last aphorism, a Latin translation of which is here appended:

"'*Quæ medicamenta non sanat, ea ferrum sanat. Quæ*

* The case is reported in the American Journal of Obstetrics, August, 1876.

ferrum non sanat, ea ignis sanat. Quæ vero ignis non sanat, ea insanabilia reputare oportet.'"

I quote from David Prince, M.D., Jacksonville, Ill., upon the same subject:

"Scirrhus and Epithelial degeneration of the tongue, and of the tissues at its base, present unusual difficulties to the application of the knife, the scissors, and the ligature.

"The difficulty of access, and the abundant vascularity, all point to the desirability of some agent which will sever the parts without loss of blood, and without the necessity for ligatures.

"The vessels are in the midst of muscular fibers crossing in various directions, on account of which a tenaculum is liable to tear out, and unless a pin is inserted previously to the application of a ligature, it is liable to slip off.

"A deluge of blood in the mouth obscures the parts upon which the knife or scissors are being applied. The cleansing away of blood retards the progress of the operation, so that the surgeon is forced to proceed with uncertainty in regard to the precise place of the deeper incisions.

"The Galvano-Cautery meets these difficulties. There need be no blood lost, though the prick of the tenaculum or vulsellum employed to hold the tongue, is apt to occasion the loss of a few drops.

"It is not that the loss of a small quantity of blood in an operation is any serious evil to a patient if it can be securely checked; it is the great satisfaction to the surgeon in being able to proceed by one step, or by many, with accuracy and with the parts in perfect view, that gives this proceeding its attractive features and entitles it to be called *beautiful*.

"For great accuracy of detail and perfection of result, it is best to proceed by short steps, or as we should say in the use of the knife, by short incisions. Time is in this case of

very little consequence in comparison with perfection of result.

"It is convenient to reverse the order of the incision by the scalpel and to imitate that of the bistoury, *i. e.*, to cut from within outward.

"The platinum wire is introduced by a needle threaded by the wire; or better, by a thread which serves as a pilot for the wire. Having been introduced and attached to the wire loop-holder, the connection with the battery is made, and the wire slowly cuts through, closing the vessels as it proceeds. In operating upon a part so vascular as the tongue, it is best to use a wire as large as No. 1 of the French and American scales for bougies, because it coagulates deeper than a small wire which lacks the necessary radiation of heat to destroy more than a very small thickness of substance. In parts presenting very little vascularity, a small wire can be used with rapid progress, but with the risk of melting at some point. The inconvenience arising from this accident, however, is only that of delay in readjusting the wire. Surgery in its esthetic aspect always loses credit by mishaps producing delay, and on this account it is desirable to work with appliances which do not get out of order in the act of using them.

"In the removal of the lateral half of the tongue, it is convenient to split the tongue first. To this end a thread is introduced at the point intended to be the posterior extremity of the incision. This thread acts as a pilot for the platinum wire, which, when drawn in, is attached to the loop-holder having connection with the battery. At this stage the median line of the tongue is embraced in a loop of wire. The writer finds it convenient to control the current by a pedal. The strength of the current and the consequent degree of heat are determined by the depth to which the plates sink in the fluid. All things being in readiness, the

plates are immersed by an assistant, while the operator makes traction upon the wire, being careful not to pull too hard, for fear of causing the wire to travel faster than the tissue becomes thoroughly sealed by a burnt crust. Having made the central incision, a lateral incision made in the same way divides the anterior pillar including the palato-glossus muscle. A third incision separates the half tongue from the floor of the mouth. This process may require additional incisions to make the separation satisfactory. Having proceeded thus far, the loop can be slipped over the half tongue which is ready to be amputated. This is gradually accomplished by traction upon the heated wire. At the conclusion of the operation the surface is dry and of a clear gray color.

"The patient, on waking from his ethereal sleep, complains of very little pain. In the experience of the employment of this agent in other regions, very little pain has been complained of, and when employed in the waking state, less pain is complained of than under the employment of knife or scissors.

"*Case* 1.—Dr. C. C., aged about 45, having been in bad health for many years and a slave to tobacco, without syphilitic taint unless inherited, observed last April a sore on the left side of the tongue opposite the molars. There is now a fissure a quarter of an inch deep on the left edge of the tongue which is three times its natural thickness. The appearance of degeneration extends back to the anterior pillar, and forward nearly to the point of the tongue. A tumor under the tongue embraces the sublingual gland, which is indurated, and between the finger of one hand in the mouth and the finger of the other under the jaw, the tumor has the feeling of a distinct body. The appearance and the subsequent microscopic examination by Dr. Black marked the disease as an epithelioma.

"A profuse salivation kept the patient spitting, and owing to the pain of mastication, liquid food had been subsisted upon for several months. September 28, 1875. The bowels having been freely moved and five grains of quinine administered, the patient at 9 A.M. took 20 drops of nitrate of amyl in an ounce of whisky and proceeded to inhale ether. The method of proceeding was that already described. Six incisions or distinct applications of the wire loop were made. The sublingual gland was extirpated after the half of the tongue was amputated, and the surface of the excavation was still further scorched by the wire loop laid on the surface.

"The duration of the operation from the commencement of etherization was 65 minutes. No blood was lost except what was occasioned by the vulsellum employed to hold the tongue previous to the adjustment of the wire.

"The patient went home, a distance of ninety miles, the second day. This was a hazardous proceeding on account of the danger of hemorrhage on the detachments of the crusts which occurred on the third, fourth, and fifth days. No hemorrhage appeared.

"There was some difficulty in swallowing for a few hours after the operation, but after once starting, there was no further difficulty.

"Oct. 26th, the twenty-eighth day from the operation, the patient returned with a growth half an inch in transverse and three-quarters of an inch in antero-posterior diameter on the inner side of the jaw and alongside of the edge of the tongue.

"The cicatrization is complete and the tongue is much impaired in its movements, but not drawn to the left side. The patient being under ether, a thin slice embracing the diseased growth was removed by the wire loop, after which a deeper burning was effected by a short, heavy loop laid

upon the surface. Swallowing was not impeded by this proceeding. He walked about the next day, and the day following he went home.

"Under date of November 10th, he wrote: 'To-day being the fifteenth since the operation, I thought best to report. Nothing special has happened—no bleeding, sloughing, all over in ten days—surface so far soft and showing no sign of hardness or tumor. Appetite good, and sleep well. Milk, eggs, and beef-tea my diet. Am encouraged so far; as before the tumor developed in the granulating process, which is not the case now.'

"*Case* 2.—J. W. M., of Lamar, Barton Co., Mo., aged 60, was sent to me by my friend, Dr. Gregory.

"There is an ulcerative excavation along the left border of the tongue extending back to the entrance of the palato-glossus muscle. The sublingual tissue is very little involved. The disease dates from last December.

"The teeth were drawn about the middle of May with the hope of benefiting the disease. In 1857, or eighteen years ago, there was an ulcer in the right angle of the lips, attributed to smoking, which healed up under the use of arsenic. He has taken arsenic several times for various afflictions, and he is now taking iodide of arsenic by the advice of Dr. Gregory.

"There is no increased flow of saliva. From the appearance and history of the disease and the subsequent examination by the microscope, the disease is considered an epithelial degeneration, nucleated cells being found in the tissues beyond the encroachment of ulceration.

"October 20, 1875. Having taken a cathartic the day before, followed by quinine in the morning, galvano-cautery was commenced at 9 A.M.

"The etherization was preceded by twenty drops of amyl-nitrite in a little syrup and whisky. The proceeding was

the same as that already described, but lasted longer in consequence of the want of activity in the battery, the fluid in which was not entirely new. *This is an admonition never to commence an important operation by galvano-cautery without having the fluid which is to afford the current absolutely new.* There was no hemorrhage, and the portion removed weighed 540 grains, or nine drachms.

"21st. Feels well, and is able to swallow liquids without difficulty. 22d. The crusts are separating and the breath is fœtid. The smell in his room is neutralized by hanging upon the gas-pendant a sheet wet with a solution of carbolic acid. 23d. Walks up street. 24th. Bleeding last night and again this morning; stopped spontaneously. The third and fourth bleedings occurred during the day. The galvano-cautery applied. 25th. The fifth bleeding occurred this morning. A more thorough application of the galvano-cautery made a final arrest of the bleeding. 26th. Walks about. Subsists chiefly upon milk. 30th. Went home.

"November 19th. His son writes: 'Father is about the same as when he reached home. The side of his face is swollen and he can hardly swallow. He complains of a weakness and soreness in his limbs.'

"These cases warrant the conclusion that any portion of the tongue can be removed without fear of primary hemorrhage. For subsequent hemorrhage the same agent affords the best means of combating it."

CHAPTER XII.

ELECTRICITY IN LABOR.

In introducing this subject to the attention of the reader, I can not do better than to quote the late Dr. Alexander Murray, from a paper read before the Neurological Society of this city, June, 1877, upon this subject. After some prefatory remarks, the doctor says:

"Meanwhile, if only for the sake of prudence and safety, I must adhere to the practice of waiting for the dilatation of the os uteri, or second stage of labor, taking care that there is no obstacle in the way of the expulsion of the fœtus in this direction, as I do with regard to all other obstacles of whatever kind, before I attempt to excite uterine contraction, or to force out the contents of the uterus before the way is free for them.

"Another matter deserving of notice is, that contraction of the involuntary muscles is always in the functional or physiological direction; onward in the gall ducts and cœcum, downward in the ureters, and downward in the uterus; but never in the antiperistaltic direction, and this no matter whether we use the descending or ascending current. However, an exception must be here mentioned, for the observation just made is based upon the supposition that the current has been transmitted generally through the organ, from fundus to cervix, and not locally or laterally, when according to Duchennes' theory we localize the application, and so the contraction. In this way it is possible to produce a narrowing at some one part only, or even an hour-glass

contraction, as Mackenzie proved by experiments on the gravid uterus in rabbits and other animals.

"The method, therefore, of employing the electric power is all-important. When Mr. Cleveland applied both poles to the abdomen he incurred the risk of inducing a partial and so an inefficient action. Some, avoiding the error of this obstetrician, have fallen into an opposite error, and included too wide a range of parts within the electrodes; as, for instance, Mackenzie, who placed one of them on the nape of the neck and the other on the cervix uteri.

"My method is to apply in cases of labor one pole to the abdomen over the fundus uteri, and the other to the coccyx and sacrum, so as to avoid irritating the mouth of the womb by the immediate touch of the electrode.

Case I.

"Mrs. H——, 28 years of age, a healthy, well-made woman, had been in labor two days with her third child. Dr. G. Wilson had been in attendance about six hours, and had administered two doses of ergot, which had augmented uterine action, but not to that degree necessary to expel the infant. Dr. W. desired my counsel in the case. I made a digital examination, which showed that the vagina was hot, and deficient in the mucus secretion of parturition. The pelvis was large, head presentation in the right occipito-posterior position, and engaged in the pelvis. The vagina was freely lubricated with oil and a stimulating enema, with the admixture of 3 ozs. of brandy administered. This treatment revived her somewhat and awakened uterine action for nearly two hours. At this stage of the case we would have given her another dose of ergot but for the fact that the fœtal heart could be distinctly heard below the umbilicus, and besides we did not wish to jeopardize the life of the child, especially since other means of effecting delivery

were at hand. After waiting for more than an hour without a return of uterine action, a faradic current of moderate strength was applied for about eight minutes; and, after an interval of three minutes' rest, the application was renewed for a period of two minutes. During the third application the uterus acted with great vigor, and in about twenty-two minutes a healthy male infant was born, face to sacrum. Child weighed 10 lbs. 2 ozs.

CASE II.

"Mrs. T——, a Jewess, was in labor with her seventh child. Her last four confinements had been tedious and exhausting, though they had resulted favorably both to mother and infant without interference. She had been in labor forty-two hours when I was called to attend her. The pains were feeble and unsatisfactory, and had recurred during the last six hours of this period, at intervals of ten minutes. I found on examination a head presentation in the second position, and fairly engaged in the brim. The os uteri was about three-fourths dilated, but easily dilatable. The membranes not being ruptured, I ruptured them, and allowed the waters to escape. This had the effect of increasing the frequency and strength of the pains for more than an hour, when they gradually became weaker and inefficient. I pushed the anterior portion of the os over the presentation as far as I deemed necessary, and then applied the faradic current in the same manner as in the preceding case. While making the application the uterus slipped off the head, when immediately the occiput rotated toward the symphysis pubis, and within twenty minutes after the first application a female infant was born alive, weighing 8 lbs.

. . . . . .

"The use of electricity in obstetrics may thus enable us to dispense with other means of augmenting inefficient

uterine action, and especially when the pains have become feeble, irregular, or intermittent. As to post-partum hemorrhage, it is undoubtedly the safest and most efficient means which we possess. Generally in tedious labor it is not a strong application that is desired so much as a current of moderate vigor and tension, with an extremely rapid interruption. I use the word rapid advisedly, as a slowly interrupted current would induce an irregular spasmodic contraction of the uterus, and thereby interfere with its due propulsive power.*

"Any good electro-magnetic apparatus, with a rapid vibration, will be amply sufficient in all cases of unobstructed tedious labor, retained placenta, or post-partum hemorrhage, and also in resuscitating suspended animation in new-born infants. But it is always advisable to have at hand in working order a double cell instrument, to avoid failure or disappointment.

"In obstetrics the form of the electrode we should use is not of so much importance. That which presents a large surface answers the best. In my own practice I am in the habit of using electrodes made of thin plates of copper or zinc, six inches in length by three in width, and covered with sponge or flannel—the latter being preferred for the sake of cleanliness. Before using, the conductor should be dipped in warm water, to avoid creating a disagreeable sensation, which a cold wet electrode is apt to do when applied to the abdominal parietes. The operation can be easily performed under the bed-clothes while the patient is lying on her back. One electrode may be placed over the fundus of the uterus, and the other applied to the sacro-coccygeal

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* NOTE.—The No. 4 Electro-Magnetic instrument manufactured by the Galvano-Faradic Company, with their new attachment for extreme rapid interruption, is all that is desired.

region—a direction corresponding as nearly as possible to the long axis of the gravid uterus.

"In my early treatment of lingering labor by faradization, I was in the habit of applying one electrode to the fundus uteri and the other to the pubis. In three cases I placed the poles over the lateral boundaries of the womb. By this method the application was too much localized; in proof of which I will mention that in one case of inertia uteri which I had under treatment, a partial hour-glass contraction of the anterior portion of the uterus was undoubtedly produced. A current passed transversely or through the anterior portion of the womb excites but a partial contraction of the organ, or only between the parts to which the electrodes are placed.

"In order to stimulate inefficient uterine action up to the normal expulsive force, we should begin the application by gliding the conductor, which is applied to the abdomen, slowly and firmly over the fundus uteri, body, sides, and especially up and down the median line, until a decided contraction of the organ is manifest. When this occurs, the conductor should be allowed to remain stationary over the fundus during the remainder of the application. This will prevent irregular uterine action. Our object is not to stimulate the uterus alone, but also the abdominal muscles, which are often in a faulty condition.

. . . . . .

"In all cases of protracted labor, with sluggish, inefficient action of the uterus in the second stage, or when uterine action has ceased, we should ascertain whether there is any obstacle in the way of delivery before applying the electric stimulus. If, after a careful examination, we find no mechanical obstruction, by which either mother or child might be injured, faradization should then be used from

five to eight minutes, or long enough to induce a contraction of the whole circumference of the uterus."

POST-PARTUM HEMORRHAGE.

I quote from the same author:

"The mode of applying electricity in flooding after delivery is a point of practice as yet unsettled. The electrode which I have had constructed for this special purpose has answered admirably in the few cases in which I have used it. The conductor is inserted into the cavity of the uterus as far as the disk, and a connection made with the positive pole, and then the circuit is closed by a large, well-moistened sponge electrode placed over the region of the uterus.

"In order to excite uterine contraction in post-partum hemorrhage, a strong faradic current is generally required, and especially when atony of the womb is very profound. But it is advisable, as a rule, to commence treatment with a moderate current, and then gradually increase its strength until uterine action is manifested. This is necessary in the majority of cases, as some patients are more susceptible to the electric stimulus than others, and it is especially necessary when the metallic electrode is directly applied to the uterine cavity. If the hemorrhage is not speedily arrested by this means, vigorous shocks of the faradic coil should be given every few seconds until a tonic contraction is induced. After the flooding has been restrained, an application of moderate tension should then be used for six or eight minutes, to counteract the tendency to relaxation of the uterine muscular fibers.

"A point I would specially insist upon is this: when the hemorrhage has been checked, the strength of the current should be reduced *very slowly*. This is important, when we consider the atonic condition of the womb. Breaking the circuit abruptly, by the withdrawal of the electric

stimulus, would result probably in a relaxation of the organ, and so expose the patient to a recurrence of flooding. It is important also to use an instrument in which the current is rapidly broken; one with slow interruptions would be productive of mischief at this stage."

ELECTRICITY IN SUSPENDED ANIMATION IN NEW-BORN INFANTS.

"The method I usually adopt is to place the child on its back, with the head and shoulders somewhat elevated, to cleanse the mouth and fauces of mucus, and while getting ready the electrical instrument and electrodes to employ the ordinary means of resuscitation or artificial respiration. Though the child should present a livid countenance, and other signs of cerebral congestion, this should not deter us from using faradism; for when respiration occurs, the livid hue will soon disappear.

"If, after a minute or two, no signs of animation can be observed, I place the infant, especially if the body is pale and cold, in a warm bath at about 98° Fahrenheit, or in an electric bath. The positive pole I apply to the epigastrium, and the negative to the apex of the heart, employing well-moistened sponges, and a current of sufficient strength to excite a full contraction of the diaphragm. When respiration occurs, but is not fully established, I use both poles labile over the precordial region, until the heart's action has become strong and rhythmical. Generally, my treatment does not cease when the beating of the heart is observed at the precordia or neck, nor when feeble respiration occurs, but only when the child opens its eyes, cries, or when six or seven inspirations are made spontaneously in the minute. The infant, after resuscitation, should be washed and dressed quickly, and with gentleness, or, what is still better, it should be wrapped in warm dry flannels, and placed on its right side in a warm bed, or before the fire, and allowed to sleep.

"Faradization to the phrenic nerve in asphyxia neonatorum is a mode of treatment I rarely employ. I lost one child by this method when life was partially restored. When applying a strong faradic current to this nerve, as soon as respiration occurs, the strength of the application should at once be reduced to a moderate degree and applied about ten or twelve times in the minute for one or two seconds only, otherwise a powerful current continued would render all our efforts to restore life nugatory.

"Faradism should be used as long as there is a probability of resuscitating the child; for fifteen minutes, at least. *In all cases of suspended animation in new-born children, powerful shocks of a faradic coil are to be specially avoided.*

CASE I.

"On the morning of the 28th November, 1874, I was called to attend a German lady, aged 19 years, first pregnancy in labor at full term. A vaginal examination showed that the os uteri was well dilated, the membranes unruptured, a right shoulder presentation—abdomino-anterior. After turning the child, and before I could extract the arms, a profuse flow of blood occurred, which continued in a constant stream from the vagina until the infant was born. This unusual and alarming casualty produced a little delay in bringing down the arms, and led me to suspect that the uterus had been ruptured. Uterine action had ceased, which was embarrassing, and placed the child's life in imminent danger, especially as the funis had already ceased pulsating. I placed the forceps upon the infant's head, and faradized the uterus by the external method. By this procedure the delivery of the child and expulsion of the placenta were speedily effected.

"The cause of the flooding was the premature detachment of a portion of the placenta.

"The child when born seemed to be dead, for the body was pale and relaxed, and the pulsations of the cord had ceased a few minutes before birth. A peculiar spasmodic eversion of the lips (not a gasping movement) occurred four or five times. This occurrence is occasionally observed when death is imminent either from delay or forcible traction upon the neck when extracting the infant's head by podalic delivery.

"The child was placed in a warm bath, about blood heat, the mouth and fauces having been previously cleansed of mucus. Faradism was applied by placing the positive pole upon the diaphragm and the negative over the heart, and using a tolerably strong current for about two minutes, when a full contraction of the diaphragm and the first feeble inspiration occurred. After an interval of about ten seconds the treatment was repeated. During the third and last application the infant opened its eyes and cried lustily. In about seven minutes from the commencement of treatment, or twelve minutes from the time the funis had ceased pulsating, the heart's action and respiration were fully established." *

ASPHYXIA.

Suspended animation, or apparent death from inhaling noxious gases, chloroform, ether, charcoal fumes, gross intoxication, or drowning, is successfully treated by faradization. It is the surest, safest, and speediest mode, therefore the best.

Faradize the diaphragm or midriff (the muscle dividing the chest from the bowels), by applying one electrode to the phrenic nerve, and the other between the seventh and eighth

* NOTE.—The above quotations from Dr. Murray are entitled to consideration. He was an educated gentleman, a close and intelligent observer, and honored with an extensive practice in this particular branch of the profession.

ribs for a second at a time, repeating it after a second again, and so continue until respiration is fully established. This treatment should be persevered in for hours, if the least indications of life are present.

Both phrenic nerves may be electrized simultaneously by means of a double electrode attached to one of the poles of the battery, the other to the diaphragm. In severe fainting fits employ the same remedy and in the same manner.

In opium poisoning the same treatment is productive of the happiest results, combined with faradization of the spine, pit of the stomach, and chest.

OPIUM POISONING.

Without going into detail upon the matter of poisoning by opium, I will quote from Dr. John J. Caldwell, of Baltimore, who published the following in the Virginia *Medical Monthly*, Nov., 1874, in which he says:

"I would call the attention of practitioners to the necessity of greater care and caution in the restoration of suspended vital functions. And, in this connection, I beg leave to refer to some of the wonderful results of the application of electricity (Faradism) in the accomplishment of such restoration; to the theory of the application of the current in these cases; and to the necessity of proper batteries and instruments being placed in all life-saving stations, police headquarters, hospitals, and other institutions.

"Case I.—In the latter part of the summer of 1873 I was called, late in the night, to see a little child, Jennie C., suffering from a poisonous dose of laudanum. The messenger bore a note from her professional attendant, Professor Murray, of this city, stating that as he had exhausted all other means without benefit, he had concluded to try faradism, at the same time inviting me to join him with my

battery. We found the patient to be deeply narcotized from an accidental dose of laudanum, taken some twelve hours previously.

"The current was passed by placing the positive pole over the pneumogastric nerve at the angle of the sterno-cleido-mastoid muscle, whilst the negative pole was placed upon the epigastrium. A powerful current was applied and continued for more than three hours, with the happy result of complete restoration.

"Case II.—On May 11, 1874, I was summoned to the Maryland Inebriate Asylum to attend the case of an attempted suicide in the person of one of the inmates, who had taken a poisonous dose of opium. The usual remedies having been ineffectually resorted to by the accomplished physician of the institution, Dr. Parrish, he requested my attendance with a battery ready for use. We found the patient in an unconscious state. A faradic battery was applied about 3 A.M., and continued constantly in use until 7 A.M., during which time the respirations were increased from seven per minute to eighteen, with the same results as we had in the foregoing case.

"Case IV.—George, a colored boy, aged 30, was so frightened by his pursuers, that he threw himself off the dock into deep water. He was fished up after half an hour, apparently drowned, much to the alarm of the by-standers, who applied the usual means in such cases. A short time afterward I was sent for, with the view of applying the current; but when I reached him, such was his condition that I had but slight hopes to encourage me, though, upon examination, I found some heat about the spinal cord and brain, and through these organs I applied a powerful secondary current for several hours. At length I discovered faint heart actions, with occasional sighs, which

gradually augmented until at last the organs resumed their functions, and the patient was restored.

"In the above-mentioned cases I used the Double Cell Battery of the Galvano-Faradic Manufacturing Company."

EXCESSIVE USE OF ARDENT SPIRITS.

Whether galvanism will prove beneficial in a majority of cases of *excessive spirit drinking* is a matter which, at the present writing, has not been sufficiently tested to form a decided opinion. However, in the few instances in which I have employed it, it has proved beneficial. Persons who were obliged to imbibe excessive draughts of spirits to allay the acuteness of painful sensations, both of mind and body, have been relieved by the systematic use of galvanism to the spine, the negative being held to the back of the neck and the positive below on the spine for five minutes at a time, repeated every other day, using a current from ten to twelve cells. The brain may be subjected to the same treatment by placing the positive to the forehead and the negative to the neck for three minutes every other day, employing four to six cells. The sympathetic nerve may be included in the treatment. Apply the positive under the ear and the negative on the lower part of the neck on the opposite side for a minute every other day.

OPIUM EATING.

This pernicious habit is mostly contracted during attacks of painful diseases, and, when once established, it is next to an impossibility to overcome it. The depression of mind is so extreme, after the happifying effects of the drug have passed off, that nothing but a repetition of the dose will suffice to quiet the nervous excitation. But few cases have been treated; still, from what we have seen, we are encour-

aged to investigate further. The same treatment recommended for excessive spirit drinking is the treatment for this habit.

EXCESSIVE TOBACCO SMOKING AND CHEWING.

Observe the same treatment as advised for excessive spirit drinking. It acts as a stimulant to the nerves. The patient, however, must put in exercise all his firmness to resist the strong hankerings of his appetite for the pernicious narcotic.

CONCLUDING REMARKS.

It may be objected by some who have not given the subject of electricity the study necessary to arrive at just conclusions respecting it, that the list of diseases is far too long; they may fail to understand how one remedy, however powerful it may be, can cure diseases differing so widely in character. It should be borne in mind, however, that electricity is not *one* remedy, but *many* remedies, depending upon the manner of its application. We obtain from the continuous current a soothing, stimulating, electrolytic, and caustic effect, and they are as manifest in their action upon the system as opiates, narcotics, alteratives, ammenagogues, or the moxa.

I do not wish, however, to be understood as saying that all the diseases enumerated in these chapters *must necessarily* be treated electrically to effect a cure; but that it is a powerful aid to the drug treatment in *all*, and *indispensable* in many, while some may be cured without its employment.

It is within the province of the physician to discriminate between remedies, and to select the safest, quickest, and pleasantest mode of cure. In his interest, therefore, and in behalf of suffering humanity, these few pages have been

indited. It has been my endeavor, as far as possible, to instruct where to place the electrodes in order to obtain the best results, and to fix upon the mind of the operator the importance of mild currents and short séances. *The intelligent reader who studies attentively the directions given, can hardly go amiss, and accomplish great good in the name of Nature's own remedy.*

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